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[OFFICIAL NOTICE.]

Annual Meeting, Western Gas Association.

SECRETARY'S OFFICE, WESTERN GAS ASSOCIATION, QUINCY, ILLS., May 14th, 1891.

In spite of all reports to the contrary, the Fourteenth Annual Meeting of the Western Gas Association will be held at the Galt House, Louisville, Ky., on the 20th, 21st and 22d days of May. The Secretary begins this announcement of our annual convention in the above manner for the reason that the idea still prevails to a considerable extent that the place of meeting has been, or may be changed. No change, however, is in contemplation, and at this late day, it would be impracticable to make one, however urgent the necessity might appear to be. As a matter of fact, there is no occasion whatever for holding the Fourteenth Annual Meeting of the Western Gas Association in any city other than the one originally decided upon by the unanimous vote of our organization. At one time it appeared that the capacity of the Louisville hotels might be taxed to an uncomfortable degree on the dates of our meeting, but the redoubtable Barret, aided and abetted by the well known firm of Dennis Long & Co., flew to the rescue and reserved accommodations sufficient for all who are likely to attend. The writer is also in receipt of a communication from the proprietors of the Galt House, stating explicitly and emphatically that no anxiety need be felt on the subject; that they are able, willing and desirous to take care of us, and will be glad to prove it if given the opportunity.

The usual reductions in transportation rates to a fare and one-third, have been granted in the territories of the Central Traffic, Trunk Line, and Southern Passenger Associations. The following is a list of the roads which make this concession in the Trunk Line territory:

Addison and Pennsylvania; Allegheny Valley; Baltimore and Ohio (Parkersburg, Bellaire and Wheeling, and east thereof); Baltimore and Potomac; *Bennington and Rutland; Buffalo, Rochester and Pittsburgh; Camden and Atlantic; Central of New Jersey (except locally between Philadelphia and New York); *Central Vermont; Chesapeake and Ohio (east of Charleston, W. Va.); Cumberland Valley; Delaware and Hudson Canal Co.; Delaware, Lackawanna and Western; Elmira Cortland and Northern; Fall Brook Coal Co.; *Fitchburg; *Grand Trunk; Lehigh Valley; New York Central and Hudson River; New York, Lake Erie and Western (east of Salamanca and Buffalo); New York, Ontario and Western; New York, Philadelphia and Norfolk; Northern Central; Pennsylvania (except locally between Philadelphia and New York); Philadelphia and Erie; Philadelphia and Reading (except locally between Philadelphia and New York); Philadelphia, Wilmington and Baltimore; Rome, Watertown and Ogdensburg (except on Phœnix Line—stations between Syracuse and Oswego); Western New York and Pennsylvania; West Jersey; West Shore.

The Southern Passenger Association is composed of the following Companies:

Alabama Great Southern; Atlantic Coast Line; Atlanta and West Point; Brunswick and Western; Charleston and Savannah; Central Railroad of Georgia; Cincinnati, New Orleans and Texas Pacific; East Tenn., Virginia and Georgia; Georgia; Georgia Pacific; Illinois Central (Lines south of the Ohio River); Jacksonville, Tampa and Key West; Louisville and Nashville (Lines south of the Ohio River); Louisville, New Orleans and Texas; Mississippi and Tennessee; Mobile and Ohio (Lines south of the Ohio River); Memphis and Charleston; Nashville, Chattanooga and St. Louis; New Orleans and Northeastern; Norfolk and Western; Pennsylvania (Lines south of Washington); Port Royal and Augusta; Raleigh and Gaston; Richmond and Allegheny; Richmond and Danville; Richmond, Fredericks and Potomac; Rome; Savannah, Florida and Western; Seaboard and Roanoke; Shenandoah Valley (Lines south of Potomac River); South Carolina; Vicksburg and Meridian; Western and Atlantic; Western Railway of Alabama.

The territory of the Central Traffic Association extends from Pittsburgh to the Mississippi River and comprises nearly all of the States north of the Ohio River. Explanatory circulars will have been sent to all of our members residing in territory of reduction in rates before this notice can make its appearance in print. Complete information as to the steps that must be taken to secure the reduction is therein given, and it is hoped that all who attend will take advantage of the reduced fares

The following is the paper list for the Louisville meeting, and as the subjects are all live ones and the discussions which are sure to follow will be livelier still, no progressive gas man can afford to absent himself:

* Only for business originating at, or destined to stations on the direct lines of these roads between Troy, N. Y., and Montreal, Canada.

"Gas Engines; With some Practical Results and Comparisons," by E. H. Jenkins, Columbus, Ga.

"On the Removal of Ammonia from Illuminating Gas, and the Best Method for Its Accomplishment," by K. M. Mitchell, St. Joseph, Mo.

"On the Practical Efficiency of a Semi-Regenerative Furnace," by J. W. Dunbar, New Albany, Ind.

"Municipal Control as an Economic Factor," by Edward Lindsley, Cleveland, O.

"An Annex to a Small Gas Plant; What Should It Be?" by Wm. Tracy, Alton, Ill.

"On the Economic Results of an Electric Light Investment, from the Standpoint of a Gas Man, Who Has Never Invested in an Electric Light Plant," by Sylvester Watts, St. Louis, Mo.

"Does It Pay to Use Inclined Retorts in Small Gas Works?" by John Gimper, Leavenworth, Kas.

"An Experimental Illustration of a Simple and Accurate Method of Determining the Commercial Strength of Gas Liquors," by B. E. Chollar, St. Louis, Mo.

So far as the social features of the Fourteenth Annual are concerned, there will be no banquets, boat rides or bouquets given to our members, but in welcome lieu thereof, an excursion to the Mammoth Cave, one of Nature's most marvellous wonders, will be tendered by our Louisville hosts. The Local Committee of Arrangements informs your Secretary that the following will be the order of business, or rather of pleasure, so far as the jaunt to the Cave is concerned:

"There will be a special train for the excursion, leaving the Louisville and Nashville station, First and River streets, promptly at the hour of eight, on Friday morning, May 22d, reaching Mammoth Cave at 11 A.M.

"The Short Route in the Cave will be taken at 1 P. M., returning at 6 P. M. There will be music (and plenty of it) and dancing (and plenty of that also) on Friday evening.

"The Long Route will be taken on Saturday morning, returning in time for lunch. The train will leave Mammoth Cave at 1 P. M., reaching Louisville at 5 P. M., thus giving ample time to make connection with all trains leaving Louisville on Saturday evening."

To the New England, the American, the Ohio and the Southwestern Associations, the "Western" offers the right hand of fellowship and good will, and extends to you all a hearty invitation to meet with us in Louisville and participate in whatever of business and pleasure may there be found. In the present, as in the past, we bid you welcome and hope that nothing may prevent your assisting us in the proper celebration of our Fourteenth Annual Meeting. A. W. LITTLETON, Sec'y.

[SPECIAL CIRCULAR No. II.]

QUINCY, ILLS., May 14, 1891.

Your Secretary desires to make especial mention of the fact that a meeting of the Board of Directors of the Association will be held in the Galt House at 10 A.M. on May 19. This meeting is called in pursuance of the provisions of the by-laws, and as matters of importance are to be considered, it is desirable that all the Directors shall attend at the time named. The Directors are:

Baxter, I. C., Detroit, Mich.	Butterworth, C. W., Florence, Ala.
Diall, M. N., Terre Haute, Ind.	Gimper, Jno., Leavenworth, Kas.
Jenkins, E. H., Columbus, Ga.	Lindsley, E., Cleveland, Ohio.
Mitchell, K. M., St. Joseph, Ohio.	Odiorne, W. H., Springfield, Ills.
Post, I. S., Chattanooga, Tenn.	

The Committees appointed by the President to act at the coming meeting in the capacities designated are:

Committee of Arrangements, Louisville Meeting.—A. H. Barret, Louisville, Ky.; James Somerville, Indianapolis, Ind.; Geo. H. Wells, Nashville, Tenn.

On Receiving and Introducing Visitors.—A. E. Boardman, Macon, Ga.; C. S. Knight, Fort Wayne, Ind.; John Gimper, Leavenworth, Kas.; Henry Pratt, Chicago, Ills.

On Nomination of Officers.—Emerson McMillin, Columbus, O.; Thos. G. Lansden, Washington, D. C.; Eugene Printz, Zanesvillle, O.; Sylvester Watts, St. Louis, Mo.; Carroll Collins, Green Bay, Wis.

On Place of Meeting.—J. B. Howard, Dubuque, Iowa; I. C. Baxter, Detroit, Mich.; Irvin Butterworth, Columbus, O.; J. S. Ambrose, Springfield, Mo.; James M. Starr, Richmond, Ind.

On Resolutions.—E. H. Jenkins, Columbus, Ga.; J. W. Dunbar, New Albany, Ind.; Jerome Croul, Detroit, Mich.; Ed. Lindsley, Cleveland, O.; E. G. Pratt, Des Moines, Iowa.

World's Fair Committee (appointed at the St. Louis Meeting).—Geo. G. Ramsdell, Phila., Pa.; A. E. Boardman, Macon, Ga.; A. E. Forstall, Chicago, Ills.; Walton Clark, Phila., Pa.; A. W. Littleton, Quincy, Ills.

A. W. LITTLETON, Sec'y.

BRIEFLY TOLD.

THE CLEVELAND (O.) CITY COUNCIL DEMONSTRATES ITS INCAPACITY.—Many of the rulers of localities in Ohio have, in the past, treated the gas world to surprises in the free and easy manner with which they dictate to those engaged in the business of gas manufacture and supply in that State. Perhaps the most pronounced instance of injustice done up to this time was afforded by the action of the Hamilton City Council when the members whereof imagined that one act of injustice could be atoned most completely by the commission of another of a still greater measure of perniciousness. We refer to the action at Hamilton, where the determination of the Hamilton Gas Light and Coke Company to hold the city to a contract so angered the authorities that they repudiated the contract and then engaged the city in the business of gas supply, both on public and private account. We believe that this case is still before the Courts, but whether the final determination is in favor of the city or Company a decision adverse to the latter cannot alter the broad fact that the city enacted the part usually played by those who trust to deceit and falsehood as weapons of defense and attack. Other Ohio instances, in which the Gas Companies have been made the shuttlecock for sharp municipal practices could be cited, but the Hamilton case, in that it is at once the most mendacious and the latest, will suffice to introduce this brief reference to some remarkable proceedings recently taken by the Cleveland Common Council in respect to the regulation of gas rates in that city. In the first place, Cleveland has enjoyed the distinction of being one of the few cities (certainly not over six in number in the country) where gas was sold for $1 per 1,000 cubic feet, and judging from the peculiar conditions governing the gas supply in that city, it was the belief of many in the profession that Cleveland had reached bed rock in her gas rates for some years to come. With the change in public officials, brought about by the spring elections, Cleveland inaugurated a Mayor who signs himself Rose, and that budding officer, swelling with the sponginess of wetted reform, finally burst out in full bloom as a champion of the gas consumer. The upshot of his flowering resulted in the placing of an ordinance before the Council which ordered that the Cleveland Gas Companies—two in number—be debarred from charging in the future, "or until further notice," a rate in excess of 60 cents per 1,000 cubic feet for the gas supplied by them to the city or to private consumers. No notice of this proposed ordinance was given to the Companies; on the other hand, the conspirators concocted the measure very much as the Italian secret societies are said to arrive at certain conclusions regarding the lives and property of others that have incurred their displeasure or excited their cupidity. When the time was at hand, the ordinance was read, the rules were suspended, and the knife-thrust at the property of certain respected citizens of Cleveland was acknowledged as having been made, according to law. It is simply surprising that anything like this could take place in any community that lays claim to a government of law and order. Think of it; the Cleveland Companies ordered, without even a chance for their existence, to supply gas at a figure that would be lower than any other gas rate in the civilized world! Even the retailer of the weakest, most nitrogenous article of fuel gas in the world would likely think twice before accepting an ordinance from the Cleveland Council that would oblige them to accept such a rate for it. And the fact that the ordinance will be resisted in the Courts, ultimately, no doubt, to its complete overturning, is poor consolation to those engaged in the gas business in Ohio, and not at all reassuring to those who would further engage in it in the same State, since the very fact that such acts can be passed remains patent, ugly and obtrusive. One thing, however, this act may hasten—it may show to those engaged in the gas business that a Gas Commission with power would be better to trust in than to be handed over to the tender mercies of the saloon-keepers, tailors, shoemakers and general quacks that go to make up City Councils—whether of Ohio or elsewhere.

THE DECISION IN THE CHELSEA CASE.—The Massachusetts Board of Gas and Electric Light Commissioners have handed in their decision in the case of the petition of certain local consumers versus the Chelsea Gas Light Company. The petitioners asked that the Company be required to improve the quality of the light furnished, that it be required to furnish both electric and gas light at all hours of the 24, and that a reduction be made on the price at which each sort of light was furnished. The Board, whose opinion was delayed for some time, in their decision find that there was some ground for complaint, and advise that the electric lighting rates are not by any means excessive, when comparisons of these are made with prices on similar service in localities furnishing a counterpart of the Chelsea situation. The Company has agreed to and is now supplying electric currents at all hours, hence that ground for complaint is dissipated. The main ground for complaint, as to the inadequacy of the light—incandescent electric lamps—furnished, the Commissioners find not well supported. They find, however, that the consumers were largely at fault, in that they expected one lamp would be equal to the work of two, that the wiring was faulty, and so on. It is also shown that at the rates charged the Company is not earning over 5 per cent. on the money actually invested in its electric annex. The Commissioners recommend that a reduction in gas rates—to take effect on July 1st, next—be ordered under the following plan: Consumers using 400,000 cubic feet per year, $1.75 per 1,000; to all others, $1.80 per 1,000—the average price received by the Company for all gas sold last year was $1.96 per 1,000. The Commissioners find that the Company's affairs are now well managed, but that it suffers from over-capitalization and other burdens resulting from the loose ways that marked the methods of its original proprietors. The report and decision are new evidences of the carefulness and thoroughness which the Commissioners bring to the matters brought before them for review.

Two Papers Read Before the North of England Gas Manager's Association.

The following papers (reprinted from the London *Journal*) on timely topics were read at the 28th half-yearly meeting of the North of England Gas Manager's Association, held at Newcastle-on-Tyne on April 25th. The first (read by Mr. David Terrace, of Middlesbrough,) was on the subject of

DISTRICT PRESSURE,

and is as follows

Although the science of the distribution of coal gas is now well understood, I apprehend that in a great many instances its principles are not carried out in their entirety. One of the reasons that may be adduced for this may be that the street mains, which are practically adequate nearly all the year through (excepting, perhaps, for two or three months in mid-winter), are made to do their work at the time of greatest demand by means of increased initial pressure. This may be considered sufficient for the time being; but when winter after winter passes, and more and more pressure has to be put on to meet the extra demands, I think it will be conceded that, at best, it is a clumsy, and often a very inefficient way of getting over the difficulty.

The premises are that gas must be used at a certain known pressure; therefore a continuous equal pressure should be maintained at the outlet of every consumer's meter, let such consumer be near or distant from the gas works or other source of supply. In other words, we are entitled to give each his due within certain limits—say, between $\frac{1}{10}$ and $\frac{1}{8}$ of an inch pressure, which should be ample for all purposes of lighting, cooking, heating, and motive power. Indeed, $\frac{7}{10}$ would meet each of these cases, if the house fittings were of sufficient size for their work. It may be urged that it is scarcely possible to give such an equal pressure at all times, and that consumers within the range of high pressure (which may at times be from $\frac{9}{10}$ to $\frac{3}{10}$) should guard themselves against it by using governors, etc. But as we have the means in our power of equalizing pressure throughout the town and district, these should be carefully adapted to furnish an ample gas supply, at a comparatively low pressure to every consumer. This is all the more necessary as it is well known that the great majority of our customers do not trouble themselves concerning the manner in which gas should be used to arrive at satisfactory results in lighting, cooking, etc., either for efficiency or economy's sake.

The circumstances under which gas is distributed are somtimes very complicated; and this leads to each case requiring a somewhat different mode of treatment. I may here mention a few of the systems of gas supply in vogue: (1) Small towns, where the works have a station governor, with trunk mains in the principal streets—the mains generally diminishing in size towards their extremities; branch mains in side streets, also diminished; the cross streets supplied through mains connecting the side streets. (2) Large towns where the works have two or more station governors supplying mains leading in different directions of consumption. (3) Larger towns, with suburbs into which the trunk mains have been extended, and possibly portions of the mains nearest the works taken up and relaid by larger ones; consequently the remarks as to diminishing in size apply in a still greater degree. (4) Compactly built cities with suburbs, which generally have two or more large gas works stations for supplying from different points, and when under one company or corporation, have the trunk mains, etc., connected. (5) Cities or large towns, parts of the area of which are on hilly districts. These, in addition to having gas stations, may have district holders on different levels of supply; or the elevated districts may be zoned—*i. e.*, separate portions at certain altitudes supplied by a main to each (the pressure being controlled by district or differential governors), or by means of a main direct from the works, and the pressure governed therefrom. (6) Great cities, where the works are at such a distance as to occasion the use of exhausters to draw the gas from the outlet main, and deliver it through street mains to the consumers—a holder or holders intervening, which serve to contain the night stock, and also to insure steadiness of pressure. (7) Combinations of the several foregoing methods or systems.

I have taken special notice of the general practice of diminishing the area of mains as the distance from the works increases. I think the trunk mains at least should be kept to their full bore throughout their entire length, for the reasons that the farther the gas travels the more is the pressure lessened, on account of the gas being drawn from the mains, and the friction is proportionally very much greater in sma than in large mains. This points to the idea that, instead of decreasing, mains should be increased in size the farther they are from the source of supply. In the latter case, the pressure is likely to be more equable than in the former. The same remarks should, of course, apply to fittings in houses and other premises where gas is employed.

I was very much interested when reading, in the *Journal of Gas Lighting* for Sept. 2 last year, the account of the manner in which pressures are controlled in the district of the Gas Light and Coke Company of London. It is briefly this: A series of high pressure mains interlace, so to speak, the ordinary street mains; joining them at certain points where a governor regulates from the high to the desired district pressure. A telephonic system places the whole in communication, so that a deficiency at any point is at once supplemented, and a surplus checked. It appears to me that this is the best and most efficient means of obtaining an equalization of pressure over towns and districts. The system, or a modification of it, would be applicable under almost any conditions of gas supply; and it would prove a preferable mode to enlarging portions of the trunk and branch mains, as the effect of doing this is sometimes of only problematical benefit, unless the whole system is revised on the lines indicated. That is to say, although greater carrying capacity may be given to certain streets or districts, the full effect intended may, and very likely does, fall far short of what would be expected.

Now that pressure registers are made portable, and to act without the slightest friction, they give a very exact and permanent record. They should be employed at regular intervals, especially during the times of greatest consumption, to ascertain the street pressures. I have here a diagram representing the pressures as simultaneously recorded at the gas works, town, and district respectively. Several other diagrams were taken during the past winter at various parts of the district; but I have reproduced what may be termed the worst case in respect of district pressure. During the time of least consumption, the pressure lines keep nearly parallel; the difference being merely due to altitude, etc., whereas at the time of greatest consumption the lines show the greatest divergence. The "Town" line shows the pressure at a point about 1,000 yards from the works, and was taken from a 16-inch main, which is supplied first through a 24-inch main on the 18-inch, and then to the 16-inch. The "District" line shows the pressure on a 3-inch main situated about 3,000 yards from the works. It should be stated that the average hourly consumption during lighting hours was about 150,000 cubic feet. It may be explained that the situation of the works is in a thickly populated industrial area of about a square mile, which is termed the old part of the town. Just outside this, on one side of it, is the new part, into which the mains have been extended. It is from the 16-inch main in the center of the new part of the town that the "Town" pressure diagram is taken. The original mains have been supplanted by the larger ones referred to, which in their turn should either be enlarged or the system advocated adopted—*i. e.*, independent high-pressure main or mains from the works direct to the new town and district.

The obligations of gas companies and corporations are becoming more onerous as regards a full and efficient gas supply during the whole of the 24 hours. Times were "easy," comparatively speaking, a few years ago, when lighting was nearly the only purpose for which gas was required. What we were inclined to grumble at then was the unproductive capital employed; and we wished for the time when the mains would be in use during the daylight hours. Now we have attained our desires—at least to a considerable extent; and we find that this brings duties along with it. In towns which are free from fogs, the demand is nearly constant. But when King Fog appears, then is the strain; and this has been very marked in several large towns during the past winter. Gas was wanted for lighting during the day; and to keep the ordinary "cooking" and "power" pressure on would have resulted in draining supplies reserved for evening hours. Hence, complaints were loud. We like the steady pull from the mains during the day, and every day; but when a few days' fogs appear—and they generally come when least expected—it is scarcely possible, with the present means at command, to cope successfully with them. Having the making power and holder room are ways of alleviating the difficulty; but even these prove futile during prolonged fogs, or dull, or very cold weather. Having the power to regulate the pressure to a nicety over the whole area of supply would prove another means whereby we could do more justice to our consumers. In some towns this is done; but very much requires to be accomplished before it can be said that it is as universal as it should be.

Discussion.

The President said he hoped they would have some interchange of ideas on this very important subject. It was one with which they had something to do; and most of them had had difficulties with it. He hoped, therefore, they would freely express their views.

Mr. J. Hall (West Pelton) said he had taken a great deal of interest in the important subject before them. A remark was made in the paper as to the pressure at the commencement of the delivery of the gas. If anyone looked up the reports of the West of Scotland Association, upwards of twenty years ago, they would see that in the town of Ayr he read a paper, on the pressure and distribution of gas, similar to the present one. In many cases they would find that the large pipes were at the wrong end of the system. In his paper he showed that it was at the place of delivery that their difficulty took place. Another point in distribution was as to the junctions. In connection with this, he found that by making them about double the usual size, and bell-mouthed, the inrush of gas was steady. His general experience was that there was a misapprehension as to main pipes, because where they should be largest they were usually smallest.

Mr. W. J. Warner (South Shields) thought that, as an Association, they were indebted to Mr. Terrace, as they would be to any gentleman who would bring the subject of pressure again and again before such Associations as theirs. He considered it good to go through the whole of a district, month by month, to ascertain the pressures, both high and low. This gave them an indication of the distribution. He believed they ought to have a town districted—dividing the higher from the lower portions. In his district, some years ago, they separated the manufacturing from the suburban or residential portion of the town. They required a pressure (say) at six o'clock in the morning, on the river side, which was not wanted in the outlying districts. It would be found that (say) at Gosforth they did not need a pressure of 1 to 3 inches at that hour in the morning; but on the river side it was different. With reference to the equalization of pressure, he differed from Mr. Terrace. He thought they could scarcely have the whole of a district or town at fixed pressures throughout the entire 24 hours, even though their plant might be capable of delivering it, and the district round were suitable. He did not believe this would be satisfactory to the consumers. Speaking of very large works, he might say he was disappointed with the paper—not with the way in which Mr. Terrace had handled the subject, but because he thought they should have had some tatistics.

Mr. J. Hepworth (Carlisle) agreed that probably not many members of the Association themselves knew what took place from time to time in the several parts of their supply outside their works. But there, before them, was a diagram which very distinctly showed them the pressure in the various parts of the town and in the outlying districts. If any argument were needed, the diagram contained it, by showing that a series of high-pressure mains, interlacing the supply, should be brought into use for the purpose of equalizing the pressure over the whole area of supply. If the diagram did not prove that, at all events it proved what a person in a small town would probably admit—that larger mains were requisite in order to equalize the pressure of gas over the whole area of supply. The subject of pressures was a very much wider one than the paper represented; and he felt that there were gentlemen in the room who had had experiences they could relate which would be very valuable. For instance, everybody did not live in such a flat district of supply as probably Mr. Terrace did at Middlesbrough. He himself came from a town where he had scarcely any difference at all in the levels; but he knew very well that in other places the levels were so interrupted that it was a matter of extreme difficulty to equalize pressure over a town of even smaller size than Carlisle. One point mentioned by Mr. Terrace was the greater necessity that now exists for giving an equal pressure during the varying requirements of the 24 hours. What they could do for the night consumption, they certainly could do for the day; and if the consumers' requirements were less in the day time than in the evening, there could be no difficulty in arranging the supply over the whole 24 hours. The great thing was to endeavor to ascertain, as Mr. Terrace has done, what the pressures were. He thought the paper was a very valuable one.

Mr. V. Wyatt (London) said there were one or two remarks in the paper which were perfectly correct, and which he found to be correct 23 years ago. At that time a great deal of discussion took place as to whether or not they should increase the size of the mains at the point farthest from the works, and the conclusion come to was that this ought to be done—that as the friction became greater so should the area of the main be enlarged to compensate for it. They did not make their pipes larger; but they compensated for it in this way: They put on an enormous pressure, of from 18 to 24 inches; and so they could send any quantity of gas through a 4 feet main to the distributing pipes at the other end of the district. They used to have a leakage of 17 per cent., and now they had only 5 per cent.

Mr. H. Lees (Hexham) would have liked Mr. Terrace to have said something about the leakage account. He had found many cases in which the consumer had had ample supply of gas at the meter, but did not get sufficient at the burner.

Mr. M. Richley (Shortley Bridge) narrated his experience in supplying gas to colleries, and asked how the pressure in such a case could be regulated.

Mr. Hall, in explanation of this, said a good deal depended upon the regulation of the steam pipe. If the steam jets were working right, every collier had his own proportion.

The President said he had listened with great pleasure and interest to the paper, which dealt with a subject he had at times found exceedingly difficult. When he looked over Mr. Terrace's diagram, he thought that really Middlesbrough must be a most blessed place to be in, for this reason—that the pressure all through could be maintained at a very low figure. In most towns a pressure of $\frac{1}{10}$ was required to give satisfaction; but he found that Mr. Terrace could satisfy people for a considerable part of the 24 hours with a pressure as low as $\frac{1}{10}$, which must keep his leakage account very low. Besides this, he noticed that Mr. Terrace had, in outlying districts, the pressure at some periods of the day as low as $\frac{1}{10}$. He should consider this would cause very great discontent, because Mr. Terrace had just told them that $\frac{1}{10}$ was the thing they might expect the consumer to be satisfied with; and therefore if the diagram before them were for a series of nights, he really did not know how Mr. Terrace managed it. In the case of having a gas works at the highest part of the town instead of at the lowest, what seemed to be necessary was to take a leading main from the most elevated down to the lowest point, and then to allow the gas to rise again. In that case there must be a heavy pressure through the leading main; but as there was no consumption off it, the leakage was not high.

Mr. Terrace, in replying, said he was somewhat surprised to find Mr. Hall's and Mr. Wyatt's experience agree with his own, in so far as they knew about this matter some 20 years since. It was rather a slur upon gas managers that, if these facts were before them so long ago, the larger mains should still be nearest the works. The facts could not have been satisfactory, otherwise gas managers would not have gone in the opposite direction. He did not think there was much in enlarged junctions, provided they had a junction which was of full size. It would possibly be an advantage, but it was a question whether it would be worth while. It was said that they should have pressure to suit the demands of different districts. What he said they should do was to set their house in order, and give a better supply at a lower initial pressure. He was surprised, when he went to Middlesbrough, to learn that they could do with so little pressure; for $\frac{1}{10}$ during the daytime was abundant. He had no complaints whatever of the pressure at night, except in the district shown on the diagram. It was certainly a fault, and this was the reason for his ventilating his experience before the members. In that district which had a very low pressure at night, if they put on pressure at the works it did not reach the point of supply. Suppose they put on $\frac{2}{10}$ at the works, it would be only $\frac{1}{10}$ in the district. Up to this time the leakage in Middlesbrough had been about 10 per cent.; this year he should be able to bring it down to 7 per cent. This was not being done by reducing the pressure, but by rectifying something that was wrong inside the gas works. This circumstance showed how careful they should be in looking into everything connected with their works. He thanked them for the kindly reception they had given to his paper.

Mr. Wyatt, in explanation of the point that additional pressure did not mean greater leakage, said that in the 4-feet mains in London, whatever the pressure might be, there was no increase of leakage; the mains were simply big gasholders.

The second paper (contributed by Mr. William Hardie) was in response to the following question:

SHOULD OWNERS OF GAS WORKS BECOME TAR AND AMMONIACAL LIQUOR DISTILLERS.

The question which I have suggested for your consideration is an important one for companies and corporations who are owners of gas works. It was incidentally alluded to at our last meeting by the President, as well as by Mr. Bower; and it has also been discussed at other Association meetings. The Legislature evidently seems to have been under the impression that owners of gas works might work up their tar and liquor; as, in recent Acts of Parliament, clauses have been inserted giving these bodies power to utilize residual products—such powers, however, not to prevent them from being liable to indictment for nuisance to which they might be liable in consequence of such operation. Very few companies have availed themselves of this power, so far as the distillation of tar is concerned. Out of 80 of the largest companies in England,

there are not more than seven who are tar distillers; and those, for the most part, only carry the distillation to the recovery of the primary products. The Gas Light and Coke Company, I believe, are different, as they manufacture with the tar several distinct specialties—such as benzol, anthracene, and other articles. Why have so few gas works a tar distillery? One reason is that, in many cases, the works are situated in the centre of large towns; and the addition of a tar manufactory might be considered a public nuisance. I know that in Newcastle, many years ago, the Company distilled their tar; but, while it lasted, they were continually being found fault with for causing the emission of bad smells and other noxious effluvia. Although committees of scientists were engaged to investigate the matter, they never arrived at a satis factory solution. By no process of reasoning could they trace the alleged smells to the tar works. Still, the agitation continued; and in order to allay it, the works were discontinued, and the tar sold to a contractor.

In addition to the nuisance that is supposed by some people to arise from tar works, there is also the apprehension of danger; and under this head we have certainly had some terrible experiences in this neighborhood by two very destructive fires, accompanied not only by loss of property, but also by the sacrifice of valuable lives. However, I think that, with increased experience which has been gained as to the management of such works, there is no doubt of their being carried on with practical safety. Still, the fact remains that, with the facilities possessed for establishing tar works, companies and corporations are not generally disposed to take advantage of them; and so I think we may conclude it is desirable to leave them alone.

Under these circumstances, the question arises as to the means of making the best of the other alternative—viz., the selling of the tar. Here, to my mind, comes in the propriety of a sliding scale, so that the benefit of the market value may be secured. Of course, a sliding scale may not be of service when the tar is sold only for one year, or even for two years. A fixed price may then be resorted to; but where a contract is to last three, or five, or seven years, a sliding scale will be found the fairest both for seller and buyer. On what principle, then, would you base your sliding scale? In one place, I find that the tar is sold at a price which is fixed by a mutually chosen arbitrator. In other places, it is decided by the profits made on the article by some large distiller; and as The Gas Light and Coke Company are, perhaps, the largest tar distillers in the world who publish their accounts, advantage is taken of these to find the price. A clause is inserted in the agreement with the contractor which stipulates that the price to be paid by him (say) for a half year shall be at the rate of so much per cent. of the price realized by The Gas Light and Coke Company during the same period for all the tar distilled at the gas works at Beckton, or sold by them. The accounts of the Company are made up every half year; and whatever difference there may be between the price charged to the contractor for the previous six months and that realized by the Company for the same period, is then adjusted. This system has been in use by several Companies in this neighborhood for some years, and has given satisfaction to both sides. I commend it to your consideration.

But while gas manufacturers keep aloof from the distillation of tar, it is altogether different with the production of ammoniacal liquor. Although, as I have said, only seven of the largest gas works distill their tar, nearly 50 out of the same number manufacture sulphate of ammonia. This is not only the case with the large works, but also with a very great number of small ones. It may be assumed, then, that it is desirable for owners of gas undertakings to make sulphate. This being so, those who enter upon the business should endeavor to ascertain the most profitable means of carrying it on. Under this head, it is surprising what marked differences there are in the results obtained. I find that the quantity of sulphate made per ton of coals carbonized varies enormously. In some places it is as low as 17 lbs.; in others, as high as 32 lbs. Of course, one reason of the difference is the kind of coal used. The best results are obtained from Wigan and Yorkshire coal. The users of these coals get, on an average, about 26 lbs. per ton; on the other hand, where Durham coal exclusively is employed, the results may vary from 17 to 26 lbs.—the average being 19½ lbs. While it would seem right, then, for gas works to have associated with them sulphate of ammonia works, there is much to learn as to the proper *modus operandi* for producing it. There may, indeed, be local circumstances influencing greatly individual cases; but the subject is one that is worthy of the most careful attention.

Those who are not doing so well in this department might consult, to their advantage, those who are doing better. The highest score reached by Durham coal, so far as I know, is that obtained by our neighbor West Hartlepool, where they get 26 lbs. of sulphate per ton of coal carbonized. A few pounds more sulphate per ton of coal means, in the cases of small works, hundreds of pounds, and in the case of larger ones thousands of pounds, more income per annum.

From the facts, then, which I have brought before you, I think it appears that it is advisable for owners of gas works to go in thoroughly for the distillation of ammoniacal liquor, while they may allow the tar to go to the best bidder; always provided, however, that the competition for the article is a fair one, and that there is no combination among buyers to keep the price down, in which case I should certainly say, "Start works of your own." My remarks are short; but if they are of any service to you in the elucidation of the important question I have dealt with, I shall be glad.

Discussion.

Mr. V. Wyatt stated that some ten or twelve years ago, when they were finishing the works at Beckton, he came down to Newcastle and proposed to the late Chairman of the Newcastle and Gateshead Gas Company a scheme for a great district factory for the treatment of gas products, to which all the products of gas works within 100 miles might be sent. By means of such a factory, they could regulate prices and get rid of the middleman. He got the idea from the central butter and cheese factories in the United States, to which the farmers forward their milk, and had a return equal to the quantity they sent. His opinion was that they could cresote sleepers, make tar pavements, and all the other derivatives from tar; and that they would get the profits to themselves—being able, he believed, to clear 50 per cent. The scheme, however, was not proceeded with. But, as the members knew, it had been carried out at Beckton, exclusively for the benefit of one Company; and it might also be carried out at Newcastle. They could have their own railway stock, and a communication from the railway to the works. He knew one Railway Company who creosoted their own sleepers; and members would be astonished to know the profit they made upon it. He noticed only recently in the *Journal of Gas Lighting* that in the United States tar was becoming so valuable that it paid to send it 1,200 miles. It would become still more valuable; and it should be the object of gas companies to get these things within their own grip, rather than let the outside public take cash out of their pockets.

Mr. W. J. Warner thought it was due to the gas managers and engineers situated on the banks of the Tyne to say that the idea which Mr. Wyatt had propounded was not an original one. He remembered, many years ago, talking of it with Mr. Hardie. It was patent to them that there were tar distilleries in the district which were common to them all; and that, by a combination, they could work up their residual products, to the advantage of the Companies in the district. He believed there was one thing which would prevent such a proposal being carried out, and that was that Gas Companies had not power to do such a thing. They would require to get special powers.

Mr. Wyatt remarked that he intended there should be a special company.

Mr. Warner said that was so. It seemed clear to them that there were very large profits on asphalt, tar pavement, and in the numberless other directions in which tar was being consumed, and that, in addition, they had their noble river, upon which products could be shipped from the gas works at almost an enormous profit; but they had not the power to go on with it. Mr. Hardie had introduced a very important subject. It was one that had often been talked over; and he hoped the time was not far distant when it might be found to be to the advantage of gas companies, as well as of consumers, that there should be a combination of companies to work up the residual products. He was much obliged to Mr. Hardie for his really valuable paper, which he thought was one of the best that had ever been laid before them.

Mr. J. Hall thought that the distillation of tar might be done in a combined way. Managers of large works might distill their own tar; but in small works it would be found to be very difficult. Some people said, "Put down the gas companies;" and the electric light people said, 'Let us extinguish them altogether." Why should they not therefore go into this matter, and so help each other?

Mr. G. Pettigrew (Gateshead) stated that within the last eighteen months they had begun to manufacture sulphate of ammonia. Formerly they used to get £160 a year for their liquor; but now they made a profit of £600 out of it. He was of opinion that it would pay in small concerns to work up the products. The distillation of tar was a thing which he at one time intended to take up; but, for want of space, he had been obliged to abandon it.

Mr. Wyatt explained that, speaking generally, tar distillation could only be undertaken in large works. The nuisance was very great. At Beckton they found that in certain states of the wind the vapors were carried for three miles before they condensed and were deposited. They

had to make special provision to deal with it; and this a small company could not do.

Mr. Warner observed that within the last two or three months the large tar distillers on the banks of the Tyne had had to remove their works to the Wear; so that the produce of the many thousand tons of coal which were carbonized on the Tyne had to be carried over to the Wear to be worked up at a very great cost. This, in their own case, had absorbed a portion of the increased price they obtained for tar.

Mr. C. Sellers (York) said he should like to have just one word of explanation from Mr. Warner. He was in thorough sympathy with the proposal that there should be combination among gas companies for the distillation of tar; and, in his opinion, great advantage would arise from it. At his works only sulphate of ammonia was manufactured; and it might be difficult to get a combination to carry out the manufacture of sulphate. Mr. Warner had said that there would be some difficulty, as the companies had not the necessary legal powers to enter into a combination as suggested. He did not himself perceive where the difficulty came in. If the Acts of Parliament authorized gas companies to distill tar in their own works, he did not see the difference between that and transferring the power to works owned by a number of companies. He should like to hear Mr. Warner explain what he meant. If the thing were practicable, he should say that something ought to come out of this discussion; and he would propose that a committee should be formed to consider how far it could be carried out, so as to test whether or not they could get the benefit which he believed they would have if any combination could be effected.

Mr. Warner said he was an engineer and not a lawyer; but to his mind it appeared that, when they obtained powers for a certain purpose, they had no power to manufacture anything else beyond the bounds which were scheduled. Their capital was for certain specific purposes; and he did not think it could be applied to any other object.

Mr. Allan (Wallsend) said he was afraid their shareholders would not agree to the proposal; and they would have to get an Act of Parliament giving them the necessary authority.

Mr. Wyatt stated that the Gas Light and Coke Company had formerly no powers to distil tar; but they went to Parliament and obtained them. In the same way, they could form a separate company in the North.

Mr. W. Ford (Stockton) pointed out that the Gas Light and Coke Company were selling gas at a very much higher price, though they manufactured their residual products, than did the South Metropolitan Gas Company. The analogy, he thought, might be carried farther; and it might be said that private undertakings might be better able to yield as good profits as would such large monopolists. He remembered the time when gas managers were allowed, as a perquisite, to manufacture residuals, for the sole purpose of getting rid of them; and his opinion was that, if gas manufacturers continued in the steady progress of their own business, the tar and ammoniacal liquor might be left in the hands of their employers. No one would say that ammoniacal liquor could not be distilled on the spot at a very high profit; but, on the other hand, there was such a diversity of opinion as to tar products, that he was very much afraid it might not pay gas companies or corporations to distill tar. After having been once or twice through the still, tar got into such a scientific class of article that no gas manager could attend to the elaborate processes that were required to produce the finer products, with a due regard to the duties to the public incumbent upon him as a gas manager. If they made him a scientific chemist, his duties as manager could not be looked after; because, as gas manager, he had to deal with the men in the retort house and with the public, and the latter did not care whether or not the gas company made a large profit. It ought not to go out from the Association that the tar distillers had robbed the gas companies. ("No, no.") As a tar distiller, he knew something about it; and he thought he could interpret the remarks to mean that gas companies had been rather "diddled" out of their profits. It was the business of gas companies and corporations to manufacture gas as pure as possible, and to sell it at as reasonable a price as they could; but he said let the day be far distant when they should form into a syndicate in a district to work up the tar. A corporation had no right to pledge their rates to come into competition with the private distiller. This country has been built up by individual effort; and if they ever came to the time when one man would manufacture for the whole universe, that would be a bad day.

Mr. Sellers disclaimed any intention of insinuating that tar distillers had been cheating them. No such feeling was in his mind, because, if he had insinuated that, it would have implied that gas managers were a set of simpletons, and men who did not know their business. There was quite sufficient competition among tar distillers to enable gas managers to get a fair price for tar. Mr. Ford had a great idea of this country, but no greater than he (Mr. Sellers) had; nor had he a higher opinion of individualism. But they saw that all businesses were being carried on by combinations, and they might expect that these would become more common.

Mr. Hepworth was afraid they had discussed Mr. Wyatt's remarks rather than Mr. Hardie's paper; but they had had an interesting discussion all the same. He did not agree with Mr. Hardie in thinking it desirable that they should leave tar distilling alone. Why was it desirable, if the works were situated outside a town, where no nuisance could be complained of, and if they were sufficiently large to permit of the operation of tar distilling being carried on, that they should not engage in it? He dissented altogether from this conclusion. Then, as to the sliding scale arrangement proposed by Mr. Hardie, he did not think it was in the power of man to conceive a fairer mode of arriving at the price to be paid for tar. It was very much wiser, he thought, for a gas company to accept short contracts, of (say) twelve months, for residuals, than to enter into contracts for such long periods as seven years. It would be found in the end, he believed, that a succession of short contracts entered into would have realized as good a price, on the average, as any other arrangement. Everybody was a sulphate of ammonia maker now-a-days. There might be gentlemen, however, whose make of gas was only (say) 5,000,000 cubic feet per annum, and it was a question whether they should become manufacturers of sulphate of ammonia. He hardly thought they should. He certainly looked in the direction which had been suggested, of having a combination of works; but he believed legal difficulties stood in the way of their joining and forming a company for the distillation of tar. But that was a difficulty which could very easily be overcome, even if it required an Act of Parliament. What he would suggest would be an Act authorizing gas companies making tar to combine; and this should be obtained without very much difficulty. In Scotland, for instance, there were many small gas works which had no special Act of Parliament; and there was nothing to prevent them sending their products to such a combined works, and getting, *pro rata*, their share of the profits realized. There was one statement in the paper to which he listened with some surprise, and it was this—that in one works as much as 32 lbs. of sulphate per ton was obtained. If he knew where these works were, he should be very happy to go there, and get a lesson in sulphate manufacture, because he had never had so great a yield. He thought they were all very much indebted to Mr. Hardie for his paper.

Mr. Hardie, in reply, thanked the members for the kind attention they had given to the paper, and also for the remarks they had made upon it. He put it down, as a general rule, that gas manufacturers should not be tar distillers; but if they could find a town where it would not be a nuisance, then they might possibly go in for it. In towns, however, of fastidious tastes, he thought it must be a very dangerous business to engage in. Mr. Wyatt's proposal for a combination tar-distilling company was an important one; but he rather agreed with Mr. Warner that they had no power for such a purpose. His mention of the 32 lbs. of sulphate per ton of coal was a detail; but Mr. Ford made 26 lbs. out of Durham coal, and this was very good.

Mr. Hepworth added that in some gas works where sulphate of ammonia was manufactured they purchased liquor from works where they did not manufacture; and the 32 lbs., or whatever their yield might be, was possibly calculated upon this, and not upon the quantity of coal carbonized in the works.

Natural Asphalt and the Preservation of Iron and Steel Structures.

"A. B.," in the *Railroad Journal*, last issue, passing under review certain statements by a contemporaneous writer who remarked that "asphalt and coal tar paints run when exposed to the sun and other sources of heat, which is a serious matter with vertical surfaces, and after a time become extremely brittle and scale off entirely, leaving the under surface exposed unless the paint is constantly renewed. In the mean time, the exposed iron and steel are being corroded by rust," admits that this is undoubtedly true with respect to such so-called "asphalt" paints as have hitherto been in the market for structural work, to which it is presumable that the first writer intended his remarks to apply. But they do not at all apply to a paint of which almost the entire body is natural asphalt, as the name ought to imply. Such a paint does not run when exposed to the sun and other sources of heat; does not after a time become brittle and scale off and require constant renewal; and therefore does not leave the iron and steel exposed to corrosion by rust. A well-made paint, the body of which is of true natural asphalt, can be subjected to any amount of heat on vertical surfaces not above that of

boiling water and not run ; and its qualities of toughness and adhesiveness are remarkably persistent and durable. Its covering quality is also excellent, and for exclusion of moisture and prevention of rust it has no superior, if it has any equal. So adhesive is it and so completely does it prevent corrosion, that when a new coating is required it is best to apply it over the old paint, with little or no scraping, thus saving a considerable item in the cost of maintenance.

The trade use of the term "asphalt," as applied to certain coal-tar products, has naturally led to some confusion of mind on the subject. But, while these artificial products have a certain resemblance to natural asphalt in some of their physical properties, they are yet chemically very unlike. They are, in fact, so wide apart in essential qualities that they are as inappropriately coupled together in the same sentence as if closely related, as things volatile and involatile, or destructible and indestructible. There is no product of coal-tar, until the final residuum of coke in the still, the constituent oils of which do not gradually volatilize by the heat of the sun ; and coal-tar products suitable for use in paints also easily become fluid when subjected to heat, so that they are liable to run on vertical surfaces, until, by evaporation, they are so far advanced on the road to brittleness that they solidify, and by a little further progress in the same direction they become brittle and scale off. On the other hand, a true asphalt paint applied on vertical surfaces does not become fluid when exposed to the sun or other source of heat ; and its constituent oils are absolutely non volatile at the highest temperature of the sun's heat, and do not change by oxidation under any ordinary atmospheric conditions—very essential qualities of permanence. It is these properties which make the finer kinds of asphalt, so important in the manufacture of coach and other black or dark Japan varnishes. The wonderful permanency and durability of natural asphalt has been demonstrated by the experience of ages. For example, Herodotus tells of its use in the construction of the walls of Babylon, and this is confirmed by modern travelers, who find abundance of asphalt among the ruins of this ancient city. Sir R. Kerr Porter speaks of picking up among the ruins of Babylon "large cakes of asphalt, more than 10 in. long and 3 in. in thickness, appearing to have been the casing of some work, perhaps the lining of a water-course." These had lain exposed to the elements for more than two thousand years, and yet retained their forms so as to indicate their probable purpose. With any substance that becomes brittle and perishable under the heat of the sun this would, of course, be impossible.

[Concluded from page 670.]

Municipal Ownership of Quasi-Public Works.

[A Paper read by Mr. Allen R. Foote, before the Taxpayers Association of Baltimore, Md.]

The economic problem for government is : How to secure a necessary income without retarding, but rather with the encouragement of, private industry.

25. What are the agencies by which increased valuation is given to property within the radius of their influence? Look about you and your first answer will be, highly developed, permanent improvements. The conditions of the tenure of possession, which alone can secure such improvements, need no further elucidation. They are a matter of common knowledge.

Sometimes it has been thought the part of wisdom to induce such improvements in certain localities by making a free gift of land or pledging the credit of the government for the cost of the improvements desired.

A government may, with the expectation of increasing the taxable value of all property under its jurisdiction, present farmers, mechanics, manufacturers, merchants, and bankers each with a titled deed to the land he requires.

Titled deed and franchise are two names for the same thing.

The value of such a gift depends entirely upon the conditions stipulated in the franchise. Would the government realize its expectations to the fullest possible extent if the conditions in the franchise were as follows?

"The conditions of this franchise are that the beneficiary shall have the right to use ordinary tools, apparatus, or implements, but if he shall desire to use improved tools, apparatus, or implements of any kind he shall first obtain a new franchise. The government shall have the right to fix annually the wages, rate of interest, or selling price of his product. This franchise shall not be transferable. It is subject to revocation, amendment, or alteration at the pleasure of the government and shall terminate absolutely at the expiration of a period of ten years."

Can human ingenuity devise conditions more paralyzing to private industry and enterprise than these? How many of the magnificent improvements in any city would be in existence to-day, think you, if it had been necessary to lay their foundations on a franchise like that?

26. If, notwithstanding the defective title conveyed in his franchise, a beneficiary undertakes to make improvements and seeks to secure funds for that purpose by mortgage, bonds, or an issue of stock, putting his enterprise into the form of a corporation, how are his securities regarded by financiers?

It is a financier's industry to obtain tools for those who can make a profit by using them. As he can not have a personal control over the management of the undertakings, he accepts a fixed rate of interest and exacts security against risk and loss. Since the uncertainties of life and industry always give some color of risk to every transaction, he raises or lowers the rate of interest a degree to correspond with the varying elements of risk and the length of time for which the tools are to be used. For this reason his rates differ all the way from the lowest rate on government bonds up to the highest rate it is possible for any person to pay.

In the case of quasi public corporations there are so many elements of risk that the most conservative financiers do not regard their securities as favorite investments and do not handle them. Those who do handle them require a rate double that of the best securities. This is a tax caused by the government, but not paid to the government. It is paid to financiers. It is an element of cost generally overlooked.

The inquiry may be made, "Does not the State fix the rate of interest?" There will be no evasion in the answer. "Certainly ; here is the law. Six per cent. is the legal rate." The law can not compel financiers to accept the securities offered or to make loans at six per cent. or at any other rate of interest.

If governments will remove all uneconomic restrictions from the franchises granted to quasi-public corporations, making their right to unmolested possession of their position and business as perfect as trades unions demand for laborers, as civil service laws guarantee to government employes, as is universally granted to farmers and all real estate owners the world over wherever industry is encouraged and a high degree of prosperity has been induced ; if this is done (the doing of it will cost nothing ; it is simply a change of economic conditions), such corporations can then obtain all the tools they can use profitably at six per cent. or less. They will then be justified in making, and can obtain the means to make, the most substantial and serviceable improvements that science can devise. Improvements so made will cost much less for maintenance and operation than those constructed in the temporary manner made necessary by a defective franchise. This is another increment of advantage wholly lost to the public by reason of the ill-advised economic conditions contained in defective franchises.

In the direction of perfecting the franchise for quasi-public corporations, and not in the direction of governmental ownership, lies the true solution of the problem.

How can the public gain the greatest economic advantages by means of quasi-public works?

27. Another feature requiring close attention is the fact that the plants of quasi-public works are useful only where they are installed and their products can be sold only where produced. In this respect the necessary limitations under which they operate are much more severe than those pertaining to laborers, farmers, other manufacturers, merchants, or financiers.

Gold is the tool of finance. It has a high intrinsic value. It can be easily transferred and can be used in any other country in the world. The basis of financial transaction is always the value of gold plus the certainty of payment in gold. In every country and for every enterprise careful note is taken of every economic condition that marks a degree more or less favorable in variation from a gold standard. For every degree a per cent. is added to or taken from the rate charged for the use of money. Money is always cheapest and most plentiful where it is subject to the least risk, always dearest and least plentiful where it is subject to the greatest risk. This law controls the finances of the world. It fixes national financial conditions. It was not established nor can it be abolished by any government.

The forces that control financial action operate from beyond the limits of all governments. They are commensurate with the whole domain of human enterprise. The municipality, State, or nation that establishes economic conditions most nearly in harmony with the requirements of economic laws will draw to itself the migratory wealth of the world as surely as the magnetic needle points to the pole.

28. It will be seen from the foregoing that unwise economic conditions in the franchises granted for quasi-public works are most potent factors in enhancing the price charged for their services. This increase

of expense is a tax on labor levied by ignorance for which no compensating gain can be shown. By a simple change of conditions that can be made without cost to any one, untold thousands of dollars can be kept in the possession of laborers, gaining for them a great and perpetual benefit.

29. Another governmental restrictive feature is the taxation of franchises or of the industries conducted under them. Such taxation is not in harmony with true economic conditions. Values accrue from improvements and the use made of them. The amount of a clearing house balance is always but a small percentage of its total transactions. If it be on the right side, however, the flow of business is unchecked. If on the wrong side, be the amount ever so small, a panic ensues and all industry is thrown into disorder. This is the effect of a tax on quasi-public works. It throws a balance, a very small balance, against the industry of the entire body of laborers. It has the power to hold in check the growth of values a thousand times its own amount. It may be said that taxes so laid differentiate themselves through the community in a way to do no final injustice. So they do differentiate themselves through the community, but, mark you, always along the line of least resistance, in obedience to a natural law, just as water seeks its level or electricity seeks the earth.

Who offer the least resistance to the collection of such taxes? Clearly, the poorest laborers. Those who are least able to choose the conditions under which they live and work, and who, in proportion to their income, are larger consumers of the services rendered by quasi-public works than any other class of the community. The income of such la borers is never equal to their necessities. Every dollar secured as an addition to their profit is a dollar at once issued in circulation.

30. The improvements made and the services rendered by quasi-public works are the cause of the wonderful growth of modern cities. To appreciate this fully, try to estimate what the valuation of a city would be without these improvements, and compare it with the valuation of today. Does not the difference in valuation exceed the total cost of these improvements many hundred times? This being true, is it not the very essence of unwisdom to restrict and tax them as is being done? If they have increased the taxable value of property so enormously, hampered as they have been by defective franchises and unwise taxation, what might not have been done, what may not yet be done, if by a change of these conditions they are brought into harmony with true economic requirements? As it is, you are choking the forces that have no power to add to their own area of usefulness without increasing the value of all property within the zone of their influence.

31. I cannot resist a desire to make a general observation at this point, though it may be a seeming digression. I wish to say to mechanics, farmers and laborers, whoever they are and wherever they may be, that there is no essential reason in the nature of things why they should not obtain the use of tools at as low a rate of interest as can their government.

The economic evils from which you suffer are the outgrowth of conditions fixed by legislative enactments in obedience to your own demands. You have been honest in your views, you have tried to gain prosperity by fixing conditions as you supposed in your own interest. You have been scared by the word monopoly while seeking to secure or enjoy the benefits of a monopoly for yourselves.

Think a moment. Government is a monopoly. It cannot pay for anything without extracting the means to do so out of the profits of private industry. Government lives on private enterprise. The real security offered by a government is the property and industry of the people. Its power to convert these to its own use, its exclusive and perpetual power to do this, is its franchise, the fundamental foundation of its credit.

Prosperity does not flow from the government to the people, but from the people to the government.

Restrictions that impair individual credit and enterprise are a direct hindrance to the production of wealth and afford no corresponding compensation. They cause an absolute loss of energy. Restrictions of the same character produce identically the same effects on corporate as on individual credit and enterprise. The people have been taught that monopolies were their oppressors. They have demanded their extinction. They have demanded that the government shall own and operate all quasi-public works and have thought that it should erect new works in competition with those owned by private corporations, the more surely to crush the life out of their oppressors. I maintain that the cause of the trouble is in the failure of the people rightly to interpret and to act in harmony with economic laws.

32. I count myself fortunate in having the acquaintance of working men who are daily contending with these problems while using as best they may the tools of their trade. I believe I voice the true demand of every honest laborer when I say for them that what they desire is, that economic conditions shall be so fixed as to enable them, with the greatest degree of certainty, to obtain by virtue and right of their own labor honestly applied, a home and an income sufficient to maintain a standard of living commensurate with the comfort and dignity due to an independent American citizen.

33. The elaboration of this subject is as broad as human experience. To select the things that may be said on one occasion is like picking up a shell here and there to carry away, leaving the whole beach behind.

Let me leave for your careful consideration a memorandum of the way you have sought to gain economic advantages without giving economic equivalents—an undertaking that must inevitably end in failure.

You cannot obtain something for nothing any more than you can maintain a vacuum in the open air.

(a) In dealing with gas companies you have sought to gain an economic advantage by issuing franchises to different companies in the ignoble hope that they would be forever fighting, and thus give you a chance to fatten on their blood. Your experience and the present condition of the gas industry in your city renders comments unnecessary to make clear your absolute failure to gain an economic advantage in that way.

(b) You are seeking an advantage by taxing the receipts of street railroad companies. You are taxing the carriages of the poor to relieve from taxation the carriages of the rich. With what results? Your street car service is pronounced, by those best qualified to judge it, to be among the poorest in the United States. Compare your service with the palace cars operated by electric power, under the management of the West End Street Railway Company, of Boston, and see the result of strangling what should be a magnificent industry. Remove the restrictions and thus earn the right to demand the best service that can be rendered for the price charged. This done, the gain of municipal income from the increased valuation of property will largely exceed the amount of the tax remitted.

(c) You complain of the poor aerial construction erected by electric lighting companies, and, in the same breath, as it were, talk about bonding the city for $2,000,000 to enable you to build a municipal plant in competition with the companies now doing business. Read the conditions fixed in their franchises and ask yourselves what kind of improvements you would make on real estate with a title containing similar conditions. Again, you are asking them to abandon a comparatively inexpensive aerial construction and to adopt an exceedingly expensive underground construction, without guaranteeing to their occupation the protection demanded for laborers by trades unions, and without offering them an increased compensation on account of increased investment. Do you think this reasonable? Is this the way to encourage industry and induce prosperity?

(d) You are calculating on the coming of the day when you can improve the service and reduce the cost of telephonic communications through the rivalry of competing companies. You might as well attempt to improve the navigation of a shallow river by dividing the stream as to undertake to secure such result in that way.

34. At every point of contact with your quasi-public industries your arrangement of economic conditions harmonizes about as well with the requirements of economic laws as the act of the man who, finding a river crossing his path, sat down on its bank to wait for the water to run by so he could cross over on dry land. That man had a long wait ahead of him. There is as long a wait ahead of you, before you will secure the largest degree of economic advantage from your quasi-public industries in the way you have undertaken and are proposing.

All ways have been tried but one. The failures suffered are the result of the operation of natural economic laws as surely as the falling of a ton block of marble when sustained by half-ton supports. You know you may try to sustain a block of marble in that way forever, and that you will forever fail. All who have tried it have given it up. Is it not time to give up trying to secure economic advantages in direct opposition to the forces of nature?

Fix all conditions for the encouragement of individual and corporate industry in harmony with the requirements of economic laws, and all the forces of the universe stand pledged to your success. Guarantee the conditions indicated, and you will render it impossible for any municipality in the world to gain an economic advantage over you.

You cannot reach this ideal without making a great and permanent gain in economic intelligence. Such a gain will brighten every life with a new hope, will guide all energy with more perfect skill, and bless all repose with secure comfort.

To secure this result your method should be to give everything for economic education, nothing for political corruption. Progress gained on such terms will be honorable and lasting.

[Abstracted from Annual Report of Gas Inspector, Mr. C. W. Hinman.]

The Quality and Power of Massachusetts Gas.

Several eudiometric analyses of some of the more interesting gases have been made. The ordinary coal gas has been analyzed so many times, and the results given in previous reports, that it has not been thought necessary to add to the number, unless for some specific object. The analyses given are mostly of mixtures of coal gas and illuminating water gas.

In these analyses no attempt was made to separate any of the higher members of the paraffine series that may have been present from the marsh gas and hydrogen; and, consequently, if any of these paraffines were present the marsh gas is given too high and the hydrogen too low. For all practical purposes one volume of hydrogen and one volume of ethane are equivalent to two volumes of marsh gas, and the analyses were reckoned on this basis.

The analyses are given in the following table:

Number of Sample.	Name of Company.	Candle Power.	Illuminants	Marsh Gas.	Hydrogen.	Carbonic Oxide.	Nitrogen.	Oxygen.	Carbonic Acid.
1	Fitchburg	18.4	5.58	36.36	48.83	6.68	1.52	0	1.23
2	Lawrence	19.2	6.13	35.53	46.02	9.90	.99	0	1.43
3	Charlestown	18.6	5.95	32.88	48.42	8.97	2.02	0	1.76
4	Dorchester	17.6	6.90	31.31	46.27	9.99	3.88	.32	1.33
5	"	19.7	7.58	29.63	45.29	13.14	3.03	0	1.33
6	Boston	—	8.03	33.15	43.85	9.47	3.59	0	1.91
7	"	20.6	10.04	24.66	41.83	18.85	2.08	.36	2.18
8	"	19.7	8.68	31.95	40.08	10.82	6.50	0	1.97
9	"	—	10.15	24.77	40.41	20.48	1.85	.21	2.13
10	Fall River	18.6	11.23	21.38	39.47	24.99	1.45	0	1.48
11	"	19.4	10.06	21.47	38.42	20.45	7.62	0	1.98
12	"	—	5.47	25.46	47.95	14.24	5.40	0	1.48
13	Worcester	—	9.45	34.26	38.05	11.19	4.68	0	2.36
14	Spencer	17.0	9.20	29.44	38.82	14 77	4.85	.76	2.16
15	Pittsfield	21.6	14.68	17.77	33.38	27.30	2.91	.12	3.84
16	Cottage City	18.9	12.29	13.95	38.01	26.71	3.61	.16	3.27
17	"	13.8	9.05	12.10	44.52	27.36	2.85	0	4.02
18	Stoughton	52.8	39.08	55.57	4.61	0	.41	.07	.26
19	Wood gas	—	11.15	28.68	11.68	9.07	27.83	3.66	7.93
20	Mixed gas	9.0	14.91	10.67	4.25	.89	54.76	12.52	2.00

No. 1 is a fair sample of coal gas purified by iron oxide. Nos. 2 to 14, inclusive, are mixtures of illuminating water gas and coal gas. The proportion of water gas in the various samples varies from one-eighth to three-fourths of the total volume. In some cases the nitrogen is rather high, and iron purification seems to have been exclusively used, as the amount of carbonic acid present is rather high. Nos. 15, 16 and 17 are water gas. No. 15 is a fair sample of cupola water gas, except that the carbonic acid is higher than usual. Nos. 16 and 17 were made by means of an apparatus of a peculiar type, and are especially noticeable for the high percentage of carbonic acid and the low percentage of marsh gas. No. 12 is a wood gas, and No. 13 is an experimental gas made from oil, water and air. The nitrogen in these last two gases is excessive.

In former reports the idea has been advanced that the illuminants in the gas made from petroleum oil were less valuable than an equal volume of the illuminants in coal gas. A direct separation of the various gases composing the illuminants is only possible when the chemist has a large amount of time at his disposal; and even then it is a rather uncertain operation. Eudiometric methods, however, permit us to determine the amounts of carbon and hydrogen in the illuminants. I have made this determination for four gases, and with the following results: The illuminants in No. 1 can be represented by the chemical formula $C_{2.98}H_{5.24}$. This is a coal gas enriched with cannel. A similar gas made by the Boston Gas Light Company some years ago gave for the formula of its illuminants $C_{2.27}H_{5.11}$. The illuminants in a pure oil gas, No. 18, were found to have the formula $C_{2.82}H_{5.21}$, and the illuminating water gas, No. 15, has its illuminants represented by $C_{2.70}H_{5.17}$.

These results indicate that the illuminants in oil gas contain less carbon per unit of volume, than the illuminants in coal gas, but that the two kinds of illuminants contain equal amounts of hydrogen.

Direct experiments have shown that the light-giving value of the illuminants depends rather on the ratio of the carbon to the hydrogen than to the actual amounts of carbon they contain. For example, the three hydrocarbons, acetylene (C_2H_2), ethylene (C_2H_4) and ethane (C_2H_6), each contain the same quantity of carbon in a given volume; but the ratios of the carbon to the hydrogen are very different. Acetylene is a very valuable illuminant, ethylene is less valuable, and ethane can scarcely be regarded as an illuminant at all.

It would seem that in some cases the gas furnished by the Massachusetts companies is capable of improvement in regard to lighting power. The average candle power of some of the gases could be profitably increased, and in other cases the fluctuations in candle power could well be less pronounced. One improvement requires increased expenditure for materials; the other, increased care or improved apparatus.

Generally the tendency to fluctuate in candle-power is most pronounced in the richer gases, the poorer gases being less variable in this respect.

Other things being equal, it makes little difference to the consumer whether he is supplied with a rich or a poor gas, provided he pays the same price per unit of light. That is, he can just as well afford to pay $2 a thousand feet for 30-candle gas as $1 a thousand feet for 15-candle gas. However, at the present price of gas making materials it seems to be decidedly cheaper for the company to supply the required amount of light by means of as rich a gas as can be conveniently burned without smoke.

For example, take two gases testing, when burned from Argand burners, 16 and 20-candles. The 20 candle gas might cost 15 or 20 per cent. more than the other to manufacture, and would be worth 30 per cent. more to the consumer, for when burned from the open burners used by the consumers, the 16-candle gas would not give a light of more than 13-candles, and the 20-candle gas would give just as much light with the open burner as with the Argand burner.

It is rather difficult to say just how rich a gas can be made and still not exhibit a tendency to smoke when burned, as the smokiness depends on the kind of gas, the burner, the rate of burning and the conditions under which the gas is burned. It may be said that, under ordinary conditions, there is no danger of smoke from 18-candle gas, and some large towns burn successfully a gas as rich as 35-candles.

There is, in this country, no single material that can be economically used for the production of 20 or 30-candle gas, and so a mixture must be used. Gas made by the destructive distillation of mineral oil, and having a candle-power of from 50 to 70 candles, is generally used as an enricher either for water gas which gives no light, or for coal gas giving a light of about 16-candles. Several companies use a mixture of the three gases. Although by means of oil gas any ordinary candle power can be attained, yet it is not so easy to keep the gas invariably at the desired standard.

The problem of mixing two or three gases of quite different candle powers under the conditions that are practically presented, so as to obtain a resultant gas of nearly uniform candle power, is one that demands great care and constant attention for its solution. When only two gases are to be mixed, as oil gas and water gas, or oil gas and coal gas, the problem is not as difficult as when all three gases are to be mixed.

When illuminating water gas and coal gas are mixed the conditions are generally not favorable for uniformity of candle power. The gases are manufactured separately and afterwards mixed, and if any temporary variation in the rate of production is desired the make of coal gas is kept unaltered and the entire change is made in the water gas. Again, the production of coal gas is always kept up day and night, while water gas is usually made only during the daytime.

It may be asked what is the harm if a gas does fluctuate in candle power if it is always kept above the legal standard. The answer is that a consumer can not change his burners for daily, weekly or monthly fluctuations of the gas, and that each kind of gas needs one particular kind and size of burner to burn it to the best advantage. The consumer should use the burner which is best adapted to the average grade of gas supplied by the company. Then if the gas is richer than usual the burner is too large and the gas is apt to smoke, and smoky flames are objectionable in various ways. If the gas is poorer than usual the burner is too small to burn it properly and the consumer gets less light than usual because he is supplied with comparatively poor gas, and also because he does not burn that gas to the best advantage.

I am of the opinion that the law should be changed so as to define more precisely the burner to be used in testing gas. The law now provides that in testing for illuminating value the gas shall be burned from the burner best adapted to it, which is at the same time suitable for domestic use.

Now the burner which gives the most light, with a given amount of gas, and the burner which is most convenient for domestic use are far from being one and the same burner.

Burners may be divided into two classes, namely, open burners or those without chimneys, and burners with chimneys; of which the best known representative is the argand burner. Open burners are the handiest, but with gases of less than 18 or 20 candle power argand burners give higher results. As argand burners have been in domestic use, especially for reading lamps, the inspector has used the best attainable argand for testing coal gas, as it is no more complicated or harder to use than any common argand. But this improved argand is of foreign manufacture, expensive, and the flame is rather easily affected by changes of pressure. For these reasons it has never practically come into domestic use in this country.

There is also another important difference between open and argand burners. Two gases of different compositions, and giving the same amount of light when burned from the same argand burner, might differ considerably in value if burned from an open burner. Both carbonic acid and nitrogen reduce the candle power of gases by their presence, but the reduction is not nearly as marked if an argand burner is used for burning as it is if the gas is burned from an open burner. For example, at one place in the State about one-half the inspections show the gas, when burned from an argand burner, to have an illuminating value of about 15 candles; when an open burner is used the gas gives a light of only from 8 to 10 candles. This gas has been found to contain comparatively large quantities of both carbonic acid and nitrogen. An ordinary gas giving a light of 15 candles, when burned from an argand burner, would give about 12 candles when burned from an open burner. Gas containing little nitrogen or carbonic acid, and from 18 to 20 candle power, gives as much light when burned from an open burner us when an argand burner is used.

At the time of the passage of the law, eleven years ago, almost all the gas in this State, with the exception of a little petroleum gas, had an illuminating value of from 16 to 18 candles, and contained little carbonic acid. As the effect of carbonic acid and nitrogen in gas, when burned from different styles of burners was not fully known, it was thought that the only effect of using an argand burner for testing would be a general increase of about 3 candles above the results obtained by using an open burner.

We now know that, to take an extreme case, the inspector may report two gases to have illuminating values of 16 and 18 candles, using an argand burner in making the test; and yet, had the best open burners been used with each gas, the poorer gas would have had an illuminating value only one-half as great as the richer gas.

There is on the market a burner, no more expensive, nearly as well adapted to domestic use, and more generally used than the argand burner now used for testing, which gives very much higher results per foot of gas burned.

The inspector is in doubt if a strict construction of the law does not require him to adopt this new improved burner in testing. He has not done so as yet, as he believes the results obtained by the use of this burner would be of no value to the large majority of consumers using open burners.

An Apparatus for Heating Substances in Glass Tubes Under Pressure.

By Mr. H. Pemberton, Jr.

[Communicated by the author to the Franklin Institute, at a meeting of the Chemical Section.]

Chemists who do not happen to have in their laboratories oil or air baths for heating closed tubes, can make an air bath at short notice from materials furnished by all dealers in steam fittings. *Order:*

(1) One 4-inch wrought iron pipe, 18 inches out to out, with usual thread on each end. At about 9 inches from either end this pipe is drilled and tapped for a 1-inch nipple, in such a manner that a pipe introduced would pass, not on a line with the radius, but about halfway between the axis of the 4-inch pipe and its walls; in other words, it would be on a line with a chord of the circle.

(2) One 1-inch wrought iron nipple, 2 inches long, 1-inch thread on one end.

(3) Two 4-inch malleable iron caps, drilled and tapped for a 1-inch pipe.

(4) One 1-inch wrought iron pipe, 24 inches out to out, with a 3-inch straight thread on each end.

(5) Two 1-inch iron caps. A hole, ¼ inch diameter, is drilled in the end of one of these caps.

The above order can be given *literatim*, and will be understood by the dealer, who will furnish, at a trifling cost, the materials cut and tapped as ordered.

Fig. 1 shows how the whole is put together. The numbers on the figure correspond also to the numbers of the paragraphs of the order as given above.

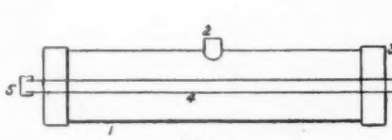

Fig. 1.

Fig. 2.

Fig. 2 is an end section. A cork is inserted in 2, and through it a thermometer, the bulb of which is on a level with the interior pipe. The whole is supported on a few bricks at either end, and is kept steady and in place by a couple of weights or half bricks. It is heated by one or two Bunsen burners, according to the temperature desired.

The Chapman Washing Bottle.

By Mr. J. W. Wainwright, Ph.B.

A reference to the figure will explain the new form of wash bottle suggested by Mr. E. J. Chapman, of the U. S. Laboratory. It consists of an ordinary tubulated flask, such as is used for distillations, fitted with two soft rubber stoppers, each having a single perforation, as shown. The spout, consisting of a small piece of glass tubing drawn out as usual, is inserted in the stopper on the side of the neck, and the

bottle is used by simply pouring the washing liquid from the spout, keeping the thumb applied to the perforation in the cork closing the neck. The stream delivered can thus, with a little practice, be very nicely regulated from single drops to a steady stream as desired.

The simplicity of this little piece of apparatus, and the readiness with which it can be made from the ordinary materials at hand in almost any laboratory, render it especially convenient, and it will be found particularly useful in the employment of such solutions as ammonia, molybdate solution, etc.

It is proposed to extend the charter of the Pensacola (Fla.) Gas Light Company for a period of 50 years, or until January 1, 1941.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

THE rates established for the sale of gas at Grand Rapids, Mich., during the current year, are as follows, as per the following official announcement recently received by us from Mr. Thos. D. Gilbert, President of the Grand Rapids Gas Light Co.: "The price for gas registered on one meter, in any one month, will be for that month as follows: 1,000 feet or more, $1.20 per 1,000: discount, 20 cents per 1,000 feet for prompt pay, or $1, net. Under 1,000 feet, $2 per 1,000; discount, 50 cents per 1,000 feet for prompt pay, or $1.50, net. Customers using 1,000,000 feet annually, 20 per cent. rebate at end of year; customers using 500,000 feet annually, 10 per cent. rebate at end of year. The discount will not be allowed unless the bill is paid on or before the 15th day of the month following that in which the gas was used." This is dollar gas of a certainty, and is the mark that was aimed at by Mr. Gilbert some years ago. Those who know him, however, will not require argument to convince them that having reached the dollar mark he will not be content to rest there. No; next year or so we expect to hear of 90 cent gas in Mr Gilbert's city. Of course the gas rate is now so low there that many hundreds of cooking and heating stoves are in use, and the coming summer will probably witness a further boom in the adoption of these sensible aids to cause the life of the housekeeper to be better worth living than when her dependence is put in the hot summer solely in the cumbersome and temper-destroying coal range. The Company sells all makes of gas stoves at the manufacturers lowest net rates.

IN the meantime, President Gilbert, warned by the fact that a 21 per cent. increase in output followed the reduction in gas rates announced about this time a year ago, is preparing his house for the extra demands that are to be made in consequence of this year's concessions. Contracts have been awarded which provide for increasing the Company's producing capacity by 100 per cent., the scheme also to include a new purifying apparatus of four boxes, each to be 20 feet by 30 feet, and a relief holder for the water gas annex. About 8 miles of new mains will also be laid this season. Well may Mr. Gilbert say, "Dollar gas does the business!"

WE are indebted to a Bangor (Me.) correspondent for the following: "The recent annual meeting of the Bangor Gas Light Company was marked by the retirement of the efficient Treasurer, Mr. W. S. Dennett, who has served in that capacity from the Company's organization, a period of about 40 years. Mr. Dennett is one of the most prominent business men and respected citizens of Bangor, and not merely his associates in the Gas Company, who have fully appreciated his valuable and efficient services, but those in outside business circles, where his sound views, ripe judgment and wise counsels, particularly in financial affairs, have long rendered most valuable aid, keenly regret the advancing years and ill-health that have decided him to gradually withdraw from active work. It is fervently hoped that with a measure of relaxation from business cares, Mr. Dennett may find returning health and vigor, and that his counsel and advice may long be availed of by the business enterprises and institutions whose prosperity he has done so much to create. The annual reports presented and read prove that the Company's business was fully up to the standard of past years, and that the outlook for 1891 could not well be improved upon. The officers chosen were: President, Dr. T. U. Coe; Clerk, Henry Boardman; Treasurer, George A. Crosley; Superintendent, A. H. Parker; Directors, T. M. Coe, A. C. Hamlin, F. A. Wilson, C. P. Stetson and J. F. Colby.—R. C."

ON the evening of May 8th, a very largely attended meeting of the Wilmington (Del.) Board of Trade is reported, and the principal topic for discussion at the meeting was whether it would be for the best interests of the city to permit Mr. Addicks and his associates to place gas pipes in the streets for supplying gas in competition with the present Wilmington Gas Light Company. The attendance was not only large in numbers but was also thoroughly representative, many prominent citizens and property holders being present. The President of the Board (Mr. Daniel W. Taylor) stated that the object of the meeting was to consider the following resolutions:

"*Whereas*, Considerable objection has been made by the Street and Sewer Department of the city of Wilmington, Del., as well as by a number of citizens of said city, to the laying of pipes in the beds of the streets by the Oxy-Hydrogen Gas Company, a corporation of the State of Delaware, for the purpose of distributing gas manufactured by the said Company; be it

"*Resolved*, By the Board of Trade of the city of Wilmington, that it is the sense of this organization that this Company should be allowed and permitted to use the streets in said city for laying pipes for the purpose provided by its charter; provided, however, that the streets of said city are left by said Company in the same good order and condition in which they were found; and

"*Resolved*, Further, that the Street and Sewer Department should grant the required permission to said Company without any further legal controversy."

Mr. Clark moved the adoption of the resolutions in order to bring the subject before the assembly, but before the debate thereon was opened Mr. Bush presented the following as a substitute for the other resolutions:

"*Whereas*, It has come to the knowledge of this Board that it is the intention of a certain association or company called the 'Oxy-Hydrogen Company of the State of Delaware' to open and excavate the streets of the city of Wilmington, for the purpose of laying gas pipes therein, without the consent of the duly constituted authorities of said city; therefore,

"*Resolved*, By the Board of Trade of the city of Wilmington, that in the opinion of this Board the opening and excavating of the streets of said city by said association or company for the purpose aforesaid would be injurious to the health of the people and a serious interruption to the ordinary and proper uses of such streets, and would not be attended with any public benefit whatever.

"*Second*, That the experience of other cities justifies the opinion that the establishment in the city of Wilmington of an association or company of the character of the said Oxy-Hydrogen Company would result in its consolidation with the older Company, a fictitious increase of capital stock and bonded indebtedness, and a corresponding increase in price of gas.

"*Third*, That the action of the Board of Directors of the Street and Sewer Department in opposition to the said unlawful and injurious use of the streets of said city by said association or company is hereby cordially approved."

The debate that followed was quite interesting, Mr. Bush especially putting forward arguments that were well spiced with interesting reminiscences of the career of Mr. J. E. Addicks, and others concerned in the Oxy-Hydrogen Company, in respect to his connection with the gas industry. Mr. Stone also made some telling points in opposition, and Dr. C. Elton Buck (who was the first editor of the AMERICAN GAS LIGHT JOURNAL) followed with some plainly put, common-sense remarks, in which he stated that "he had seen enough of so-called gas competitions, and that nothing had ever been gained by them. The price always goes up, to the detriment of the poor consumer." Mr. Field spoke in favor of the Addicks scheme, but based his argument thereon on the ground that combination and subsequent increase in the gas rates could be prevented by the authorities. When the substitute resolutions were put to vote it was unanimously agreed that they should be accepted in lieu of the original proposition.

THE proprietors of the Citizens Gas Light Company, of Willimantic, Conn., recently caused to be printed in the Willimantic *Journal* an article descriptive of the way in which gas is made, and at the same time detailing the ways and means for its successful use by consumers as a lighting, cooking, and heating agent. The article, which is written on lines appealing to the reader from a popular point of view, is excellently compiled, in that its main points are so prominent that reading means conviction. The article took up five columns of the *Journal*, and it ought to sell many an extra thousand feet of gas for the Company.

THE City Council of Woodbury, N. J., has entered into a contract with the Consumers' Gas Company for the public lighting, under which the Company agrees to maintain a certain number of lamps "on all dark and moonless nights" during the year, at the rate of $18 per lamp per annum. The Woodbury Electric Light and Power Company was also authorized to maintain 43 high candle power arcs, on the same lighting table as that applicable to the gas lamps, at the rate of $85 per annum each.

A CASE on trial, without a jury, before the Superior Court, Portland, Me., is that of the Brunswick Gas Light Company *vs.* the United Gas, Fuel and Light Company. From the papers in the claims it appears that the defendants leased the plant of the plaintiff Company for a period of 25 years, agreeing to pay therefor a rental of $1,000 per year and the taxes, and also to guarantee the bonds of the plaintiff Company. The defendants ran the plant a year and one-half, when they abandoned the lease, wherefore the suit is brought to recover the rent due, taxes unpaid, injury to plant, damage to business, etc., assessing the amount at

$10,000. The defendants claim that Marcus Williams, who executed the lease on the part of the defendant Company, had no authority to do so. They admit that the rent and taxes were not paid, and assert that no damage was done to the plant, and that the business of plaintiff Company was not injuriously affected.

SOME days ago, in the Circuit Court, Belleville, Mo., Mr. W. D. Griswold, President of the East St. Louis Gas Company, sued the city of East St. Louis for $50,000, on a contract for the public lighting, made on behalf of the city by the Common Council of the date noted, that was to last for ten years, the annual payment on that contract to be not less than $10,000. About 13 months ago the reigning Council decided to substitute electricity for gas, and discontinued the use of the latter. The authorities based their action on the belief that a contract binding the city for a term longer than a year is not valid, as a Council has no power to bind the city beyond the period of the life of the Council. The Company was paid in full up to the time that the use of gas was discontinued, but asserts that it has the right to recover the entire amount named in the original contract.

AT the annual meeting of the United Gas Improvement Company the following officers were elected: Directors, W. G. Warden, George Philler, Thos Dolan, H. C. Gibson, W. W. Gibbs, Wm. L. Elkins and P. A. B. Widener; President, Wm. G. Warden.

THE following (from the Cincinnati *Commercial Gazette* of recent date) explains itself: "Theodore Horstman, the newly-elected Corporation Counsel, transmitted the following, which was referred to the Committee on Light and the Engineer. It will not be heard from again by this Board: 'In compliance with the resolution of your Board, passed April 22, 1891, requesting me to prepare the necessary ordinance to provide for the purchase, by the city, of the gas works, in accordance with the privilege of purchase reserved by the city in the Conover contract, I have the honor to submit the inclosed ordinance. You will observe I have ommitted the names of the appraisers, which names should be inserted. In selecting the two appraisers on behalf of the city, it is important to bear in mind the decision of Justice Swayne in the case of Sophia C. Deane *vs.* The Cincinnati Gas Light and Coke Company and the city of Cincinnati, in the U. S. Circuit Court for this district. In the year 1866 the question of the purchase of the Cincinnati gas works was agitated, and Council resolved to submit the question as to whether the gas works should be purchased to the electors of the city at a special election to be held on October 9, 1866. At that election there were 15,238 votes cast in favor of the purchase of the gas works, and 6,052 against the purchase of the gas works, making a majority of 9,186 votes in favor of the purchase of the gas works. Pursuant thereto the Council appointed as appraisers on behalf of the city Messrs. Miles Greenwood and Henry Kessler. Justice Swayne enjoined said appraisers from acting, on the ground that they were not disinterested, being taxpayers and gas consumers in the city. Afterwards the price of gas was reduced, and the question of purchasing the gas works was dropped.'"

"'An ordinance to provide for the purchase by the city of the pipes, buildings, fixtures and other appurtenances owned and used by the Cincinnati Gas Light and Coke Company in providing the city and citizens with gas.

"'Section 1. Be it ordained by the Board of Legislation of the city of Cincinnati, that the city of Cincinnati purchase from the Cincinnati Gas Light and Coke Company, the owners of the gas works of this city, the pipes, buildings, fixtures and other appurtenances owned and used by the said Cincinnati Gas Light and Coke Company in and about providing the city and citizens of Cincinnati with gas, in accordance with the terms of Section 7 of the ordinance passed August 23, 1854, providing for the lighting of the city of Cincinnati with gas, and the statute securing to the city the right to purchase such works and the appurtenances belonging thereto.

"'Sec. 2. The Board of Legislation hereby selects and appoints Messrs. —— —— and —— ——, two disinterested persons, on behalf of the city of Cincinnati, for the purpose of ascertaining and determining the price and compensation to be paid by the said city for the purchase of said pipes, buildings, fixtures and other appurtenances, in accordance with Section 7 of said ordinance, passed August 23, 1854, and the Corporation Counsel is hereby directed to appear on behalf of the city in the inquiry and hearing as to the value of said property.

"'Sec. 3. The expense incurred on behalf of the city in connection with said proceedings shall be paid out of the light fund, and upon vouchers to be approved by the Board of Administration.

"'Sec. 4. This ordinance shall take effect and be in force from and after the earliest period allowed by law.'"

AT the annual meeting of the stockholders in the Summit (N. J.) Gas Light Company, held at the offices of the National Newark Banking Company, No. 759 Broad street, Newark, N. J., the following Board of Directors was chosen for the ensuing year: George G. Porter, Eugene Vanderpool, Andrew A. Smalley, James S. Graves, A. F. Wehner, Henry R. Smith and B. J. Allen. Subsequently the Board was organized by the election of the following officers: President, Andrew A. Smalley; Treasurer, Eugene Vanderpool; Secretary, Henry R. Smith.

THIS goes to show that the beautiful residence district west of the Oranges is soon to have a gas supply of its own, from a works centrally located, instead of, as was surmised some months ago, or at the time that the project for a works at Summit was first broached, that the supply would come from the mains of the Citizens Company, of Newark, of which Mr. Smalley is also President. There can be no doubt that an independent Company would prosper in the district, which could be made to take in the adjoining towns of South Orange, Milburn, Short Hills and Summit proper. A look over the Directoraie of the new Company ought to make it plain that those in charge of its fortunes are well up to the business of making and selling gas.

THE April grand jury, Davenport, Ia., signalized itself by handing in an indictment against the Davenport Gas Light Company, charging the latter with maintaining a nuisance. The nuisance charged is that of running the refuse from gas manufacture into the Mississippi river. The indictment also severely censures the local Board of Health for failing to abate the nuisance.

SANTA CLARA COUNTY, Cal., is hugging itself with delight over the belief that natural gas is soon to be "on tap" in her immediate vicinity. In any event, a small strike was recently made on the Main Ranch, near Los Gatos, a gas vein having been tapped at a depth of 540 feet, the flow—which did not exceed over 12,000 feet in the 24 hours—from a 2 inch pipe coming out at a pressure of 50 pounds.

A GREAT deal of mystery seemingly attaches to the incorporation of a Company, the articles for the formation of which were filed at Albany about mid-April. Stripped of its Machiavelian aspect, however, the Company fails to assume anything like importance, if one may judge so by its sponsors, who are returned as Charles W. Blodget, Frank J. Logan, Charles L. Rowland and Bernard F. Fielding. Its particular name is the Newtown (L. I.) Gas Company, and it is capitalized in $10,000. Newtown, which is a township of Queens county, L. I., is bounded by Brooklyn, Long Island Sound and the East river, and contains several important villages, but the place is not noted for anything much apart from mud and fouled atmosphere. Mr. Fanshawe, of the new Equity Gas Company, will likely appreciate the Machiavelian reference of the Newtown affair to his own enterprise, and the Honorable Mr. Bixby, of New York, could possibly also teach some of the amateurs of the Newtown Company the proper way to accomplish ends that are worth while trying for.

WE are indebted to Mr. H. P. Townley, President of the Townley Stove Company, of Terre Haute, Ind., for the following remarkable figures, prepared by Professor Noyes, of the Rose Polytechnic Institute, purporting to be the results gained from an analysis of the gas supplied in Terre Haute by the Citizens Gas and Fuel Company. The figures are given without further comment, save that they seem to indicate that the gas is "fearfully and wonderfully made:"

Carbon dioxide	2.4
Illuminants	21.3
Oxygen	0.8
Carbon monoxide	8.7
Marsh gas	19.5
Hydrogen	14.9
Nitrogen	32.4

The heat units are returned at 676, and the specific gravity is said to be .940. Beyond a doubt these are figures that are worth studying, and they are, we fear, also likely to cause laughter. A strictly non-carbureted fuel gas with 21.3 per cent. of illuminants looks a staggerer, although a specific gravity of .940 may account for the great carrying powers of the "total product." Taken all in all, it might be the better way, were the figures permitted to speak for themselves, and they certainly will attract attention to Professor Noyes.

ACCORDING to the St. Louis *Post-Dispatch* a petition for an injunction to prevent the consolidation of the Laclede Gas Light Company and the Municipal Electric Light and Power Company was filed in

Judge Withrow's room of the Circuit Court, on the morning of the 7th inst. The petition is filed in the name of the State, at the relation of Ashley C. Clover, Circuit Attorney for the Eighth Judicial Circuit, in accordance with the rule of procedure that requires the State to be the plaintiff in such cases. The petition first sets forth the notice of the respondent companies, and defines the powers and privileges granted them under their charters, to manafacture, distribute, and sell gas and electric light respectively. It then presents a copy of a lengthy agreement entered into by the two Companies on April 30, signed by James Campbell, President of the Municipal Electric Light and Power Company, and J. D. Thompson, vice, Acting President of the Laclede Gas Light Company. The agreement contains the terms of sale of the former to the latter. It provides that the property, plant, papers and moneys of the Electric Company shall be conveyed to the Gas Company, in return for which the Gas Company is to issue to the Electric Company, or whoever it may direct, 15,000 shares of Laclede common stock, of the par value of $100 a share, making a total value of $1,500,000 in non-assessable stock. In addition to that the Gas Company is to assume the bonded debt of the Electric Company, which is represented by 1,500 twenty-year bonds of $1,000 each, bearing interest at 6 per cent., payable semi-annually. The Gas Company is not required to issue any stock to the Electric Company until 8,000 of the 15,000 shares of Electric Company stock, signed in blank, is delivered to the Gas Company; and after that it is to issue whatever amounts are called for by the Electric Company as the stock of the latter is turned in. In other words, the Gas Company will issue no stock until it holds a controlling interest in the Electric Company. After citing the agreement the petition states that the two Companies have further agreed that the Electric Company shall go out of business. That, it asserts, is illegal, because the two Companies are competitors and they cannot legally buy or sell out, one to the other. Furthermore, in accepting its charter the Electric Company assumed an obligation to the public from which it cannot be absolved by a sale of its stock. It must, under that charter, continue to do business. Another agreement, which is declared to be illegal, is that the Electric Company is to discourage others from going into the electric lighting business in St. Louis, and more illegality is discoverable in an agreement between the two Companies and parties of the third part, Messrs. Ladenberg, Thalmann & Co., H. B. Hollins & Co., and Seligman & Co., that the Electric Company will not go into the electric lighting business in St. Louis for a term of 10 years. The complainant avers that the Gas Company has no right to go into the agreement under the terms named or to impose the obligations of the agreement upon the Electric Company. The Gas Company, it says, has no right to acquire the stock of a rival and thus create a monopoly of the lighting business, and the Electric Light Company cannot escape the obligation to furnish light and power which is imposed by its charter. Judge Withrow granted a temporary injunction to stand until May 12, when the respondents were ordered to come into Court and show cause why the injunction should not be made perpetual.

UNDER a recent decision of the Customs authorities "dead oils" are required to pay a duty of 25 per cent. ad valorem, under the new tariff act of last October, instead of 20 per cent. ad valorem, as was the former custom.

ADVICES from Springfield, Ills., under date of May 8th, are to the following effect: "The several bills variously affecting the Gas Companies of the State were recently considered by the House Committee on Municipal Corporations. These bills, which were some time ago referred to a sub-committee of 5, with directions to embrace their good features in one bill, were reported back with the indorsement that the sub-committee found it impossible to agree upon a bill. Mr. Dixon stated that a majority of the committee preferred the bill introduced by Mr. Dearborn, which authorized cities, villages and incorporated towns to construct and maintain their own gas and electric light plants by special assessments; but there was much doubt in the minds of the sub-committee as to the constitutionality of such a bill. They also doubted the wisdom of hasty legislation in such a direction. More than one subject was embraced in the title of the bill, and should it be passed the legality of special assessments made under its provisions would certainly be questioned, with probable good effect. Mr. Miller wanted the further consideration of the bills postponed, so that he could examine the Dearborn bill. The bill was again read, whereupon Messrs. Allen and McCrone gave it as their belief that the bill was unconstitutional. It was finally determined to recommend the tabling of all the measures bearing on the subject that had been introduced at this session. That action virtually disposes of gas legislation for the State of Illinois this year."

AT the annual meeting of the Spanish-American Light and Power Company, of Havana, Cuba, the following officers were chosen: President, Thos. J. Hayward; Vice-President and Treasurer, R. A. C. Smith; Secretary, W. H. Smith; Trustees, T. J. Hayward, Michael Chauncey, H. P. Booth, John T. Gibbons, Wm. A. Marburg, H. G. Runkle and R. A. C. Smith.

AN effort will be made to install an electric lighting plant on the premises of the State Industrial School at Rochester, N. Y. The buildings are now lighted by gas.

ANOTHER syndicate is making preparations to induce the city of Philadelphia to part with its gas works, and a prominent member thereof is Mr. A. J. Cassatt, of Pennsylvania Railroad fame.

AT a special town meeting, Ausonia, Conn., the making of an agreement for the arc lighting of the streets outside of the borough came up, and the discussion was terminated by awarding a contract for the work to the Derby Gas Company, of Birmingham, the agreement to last for five years, and to be dated back from October 1, 1890. The price fixed was $60 per light per annum, moontable. The Gas Company, in the absence of a time contract, had been carrying on the lighting at the rate of $75 per lamp per year.

THE American Meter Company is securing its share of the meter business, as usual, and among the orders now on its books for station meters we note the following:

Size.	Purchaser.	Daily Capacity.
48-in.	Safety Car Heating and Lighting Co.	82,000 cu. ft.
48-in.	Cleveland, Ohio	82,000 "
60 in	Coney Island Co., N. Y.	164,000 "
78 in.	Davis & Farnum, for Concord, N. H.	315,000 "
84-in.	Kings Co. Ill. Co., Brooklyn, N. Y.	400,000 "
96-in	Citizens' Co, Brooklyn, N. Y.	525,000 "
18 ft. 6 in.	Consolidated Co., N. Y.	7,000,000 "

The first-named meter is to be installed by the Safety Company in its station at Savannah, Ga. The 84 in. meter for the Kings County Illuminating Company will be put at the holder site of the Company at New Utrecht (the gas is to be taken from the Citizens Company, of Brooklyn), and the 96 in. meter is intended to measure the gas that will be supplied from the Citizens' Company's mains to the new Company. The meter for the Consolidated Company is to be a duplicate of the one erected by the American Meter Company at what is now the 21st street (East) station in 1882, and will be placed alongside of it. The case is to be of wrought iron, to be furnished by the Continental Iron Works, and the drum is to be of the Parkenson three-partition type. The meter will be in position by September 1st, and when it is placed the meter-house at the 21st street station will be doubly worth a visit from gas engineers, who, on their travels, find themselves passing through New York.

THE Directors of the Consolidated Gas Company, of Baltimore, Md., have declared a dividend of 1½ per cent. on the capital stock, payable June 1st.

AT the annual meeting of the Columbus (Ohio) Gas Light and Coke Company, 71,747 shares out of a total of 72,000 shares were represented. The annual election resulted in the return of the retiring Directors, who chose the same officers that acted last year.

The Market for Gas Securities.

The city gas share market was remarkably dull during the week, prices, however, having been fairly well maintained. Consolidated opened (Friday) at 98¾ to 99. During the week 300 shares were sold at auction, at 98½ to ⅝. The Standard Gas Light Company, of this city, has elected the following Board of Directors: W. C. Andrews, J. A. Bostwick, Russell Sage, D. H. McAlpin, John T. Terry, H. H. Brockway, Frank Tilford, Charles Dana and F. McKeige. Equitable was inquired after, and Mutual also attracts the attention of investors.

The Brooklyn situation does not show much improvement, although the scare of a week ago is less vivid now that its first flash is spent. It is likely that the $1.25 rate will precipitate consolidation in Brooklyn, and at the prices at which the shares are now selling, there is a good profit in every one of them, with that contingency put in the estimate. The passing of the old Brooklyn Company's dividend should not alarm holders of these shares. Sometimes dividends are declared when they have not been earned, at other times dividends are passed when they have been earned. The dividend rate on San Francisco gas has been increased to 35 cents per share instead of 30, as before, and the stock has made a sharp advance.

Gas Stocks.

Quotations by Geo. W. Close, Broke and Dealer in Gas Stocks,

16 Wall St., New York City.

May 18.

☞ All communications will receive particular attention.
☞ The following quotations are based on the par value of $100 per share.

	Capital.	Par.	Bid	Asked
Consolidated	$35,430,000	100	98¾	99
Central	500,000	50	90	100
" Scrip	220,000	—	95	100
Equitable	4,000,000	100	116	119
" Bonds	1,000,000	—	106	108
Harlem, Bonds	170,000	—	—	—
Metropolitan, Bonds	658,000	—	110	115
Mutual	3,500,000	100	119	121
" Bonds	1,500,000	—	100	102
Municipal, Bonds	750,000		—	—
Northern		50	—	—
" Bonds	150,000	—	—	100
Standard Gas Co—				
Common Stock	5,000,000	100	—	48
Preferred	5,000,000	100	—	90
Yonkers		50	112	—
Richmond Co., S. I.	346,000	50	—	—
" Bonds	20,000	—	—	—
Gas Co's of Brooklyn.				
Brooklyn	2,000,000	25	100	105
Citizens	1,200,000	20	88	90
" S. F. Bonds	320,000	1000	100	103
Fulton Municipal	3,000,000	100	—	130
" Bonds	300,000		100	105
Peoples	1,000,000	10	85	91
" Bonds (7's)	368,000	—	100	—
" " (6's)	94,000	—	100	—
Metropolitan	870,000	100	100	103
" Bonds (5's)	70,000	—	—	—
Nassau	1,000,000	25	132	—
" Ctfs	700,000	1000	100	102
Williamsburgh	1,000,000	50	—	127
" Bonds	1,000,000	—	108	112
Out of Town Gas Companies.				
Boston United Gas Co.—				
1st Series S.F. Trust	7,000,000	1000	87	—
2d " " "	3,000,000	1000	—	74
Bay State Gas Co.—				
Stock	5,000,000	50	62	—
Income Bonds	2,000,000	1000	95½	—
Buffalo Mutual, N. Y.	750,000	100	105	110
" Bonds	200,000	1000	95	100
Citizens, Newark	1,000,000	50	155	160
" " Bonds.	45,000	—	–	–
Chicago Gas Company.	25,000,000	100	49½	49⅝
Chicago Gas Light. & Coke Co.—				
G't'd Gold Bonds	7,650,000	100	90½	92
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1000	—	97½
People's Gas and Coke Co., Chicago—				
1st Mortgage	2,100,000	1000	—	100
2d "	2,500,000	1000	94	98½
Consumers Gas Light Co., Jersey City	2,000,000	100	12	15
Bonds	600,000	1000	70	75
Cincinnati G. & C. Co.	6,500,000	100	207	209
Consumers Toronto	1,000,000	50	169	172
Central, S. F., Cal			90	—
Capital, Sacramento, Cal			58	
Consolidated, Balt.	11,000,000	100	46½	47
" Bonds	6,400,000		107	107½

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By a young man fully experienced in the details of construction, manufacture, and distribution. Best of references. Address
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819-tf New Haven, Conn.

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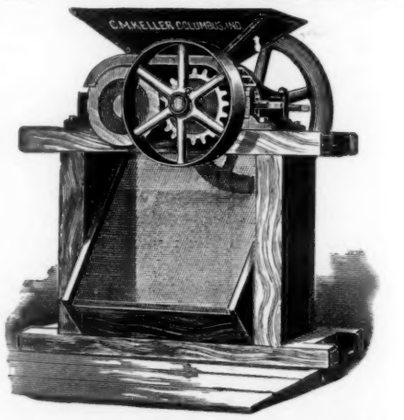

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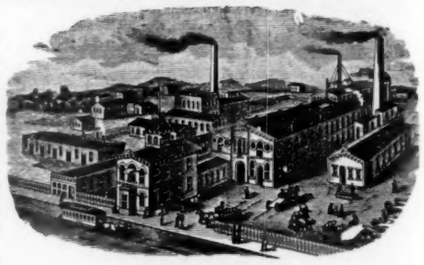
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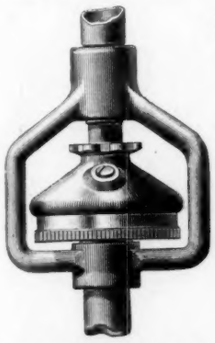

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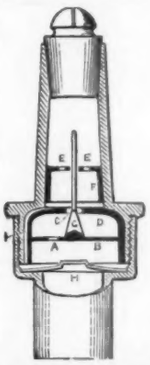

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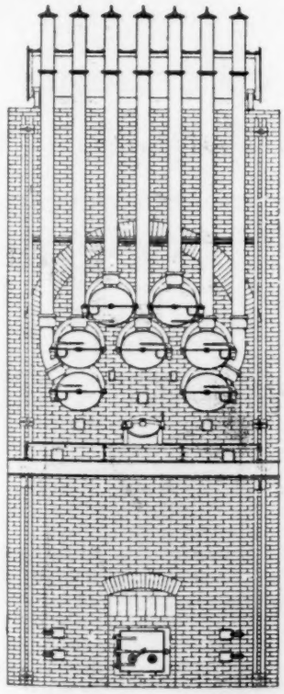

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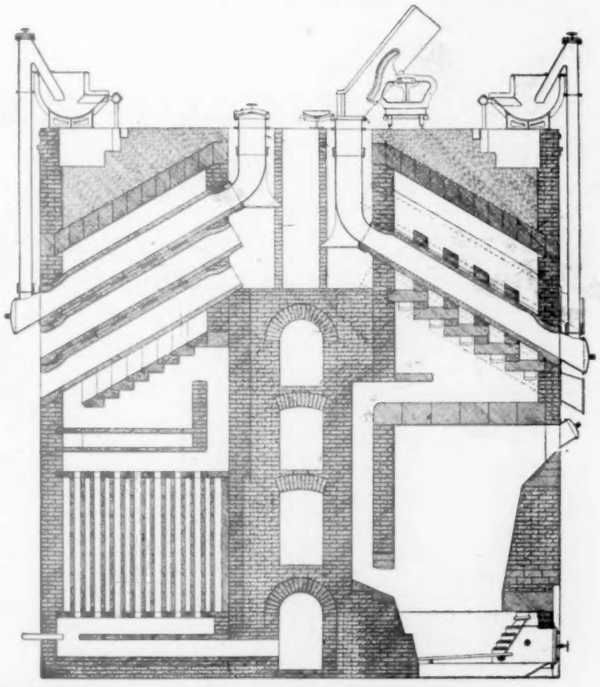

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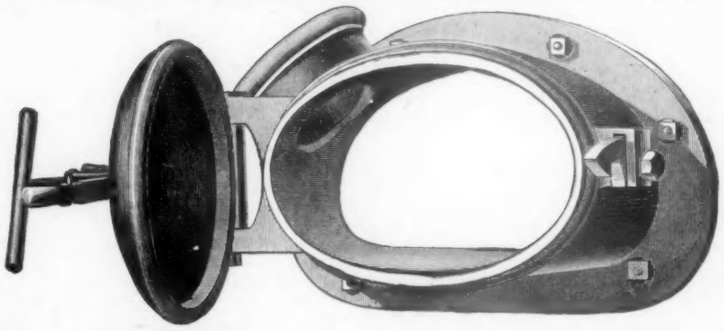

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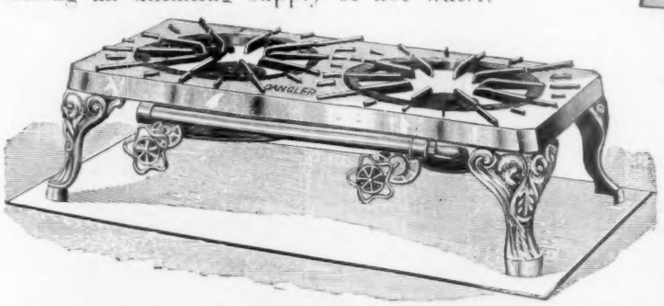

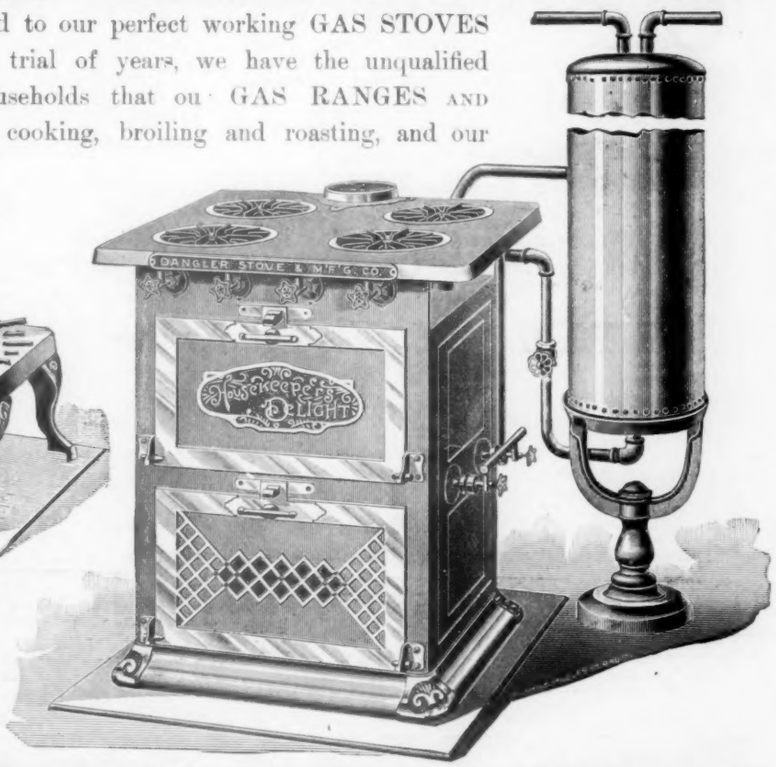

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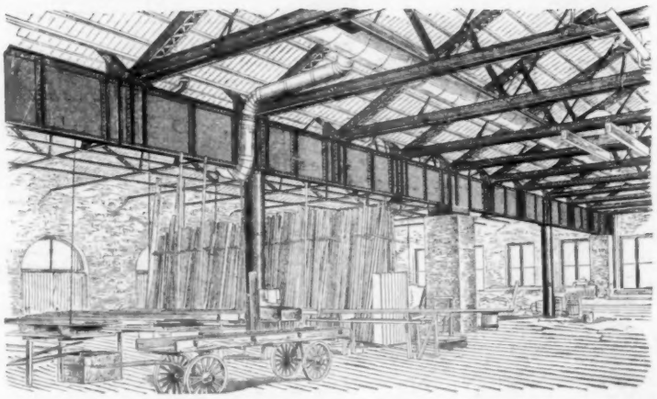

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The above illustration is taken direct from a photograph showing an iron truss roof designed and built by us for the Coe Brass Mfg. Co., at Torrington, Conn., over their new Tube Mill. The photograph is taken at a point showing the connection between the Muffle Room and the Rolling Mill, the trusses being supported by girders, columns, etc., as shown.

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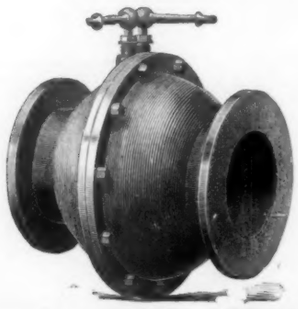

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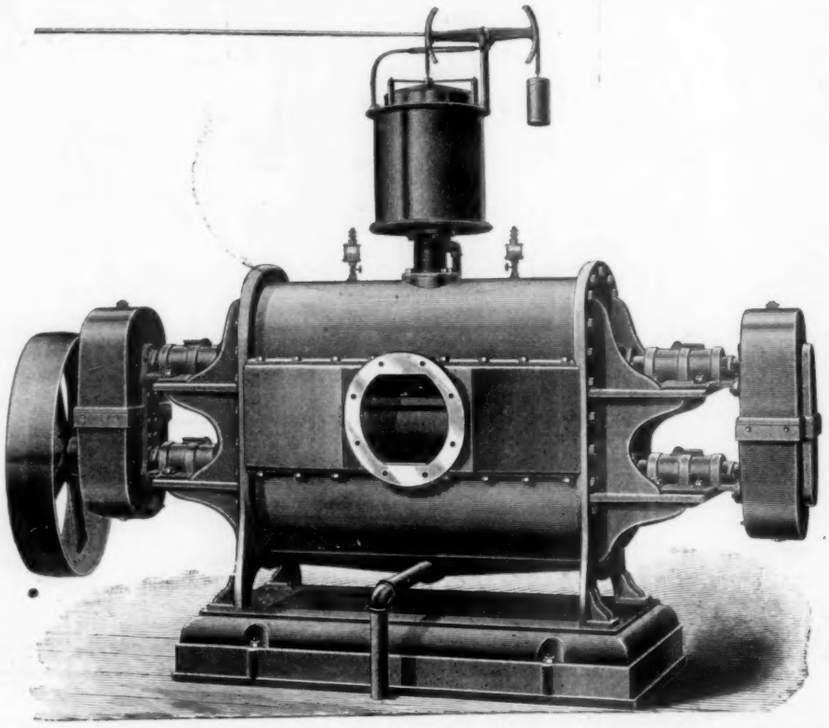

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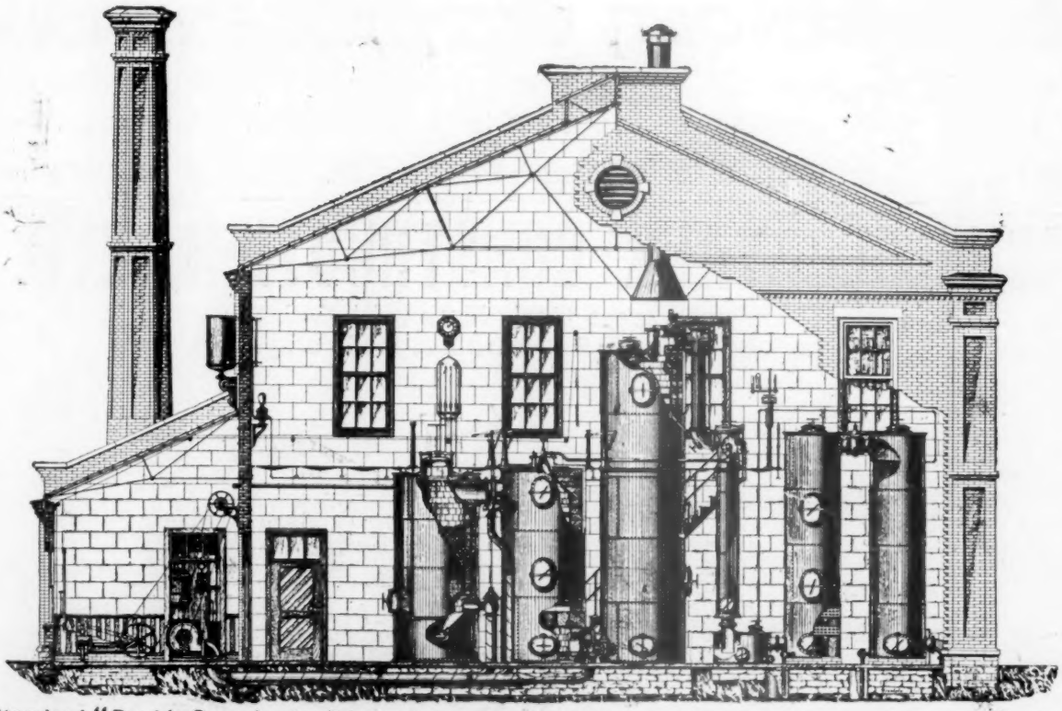

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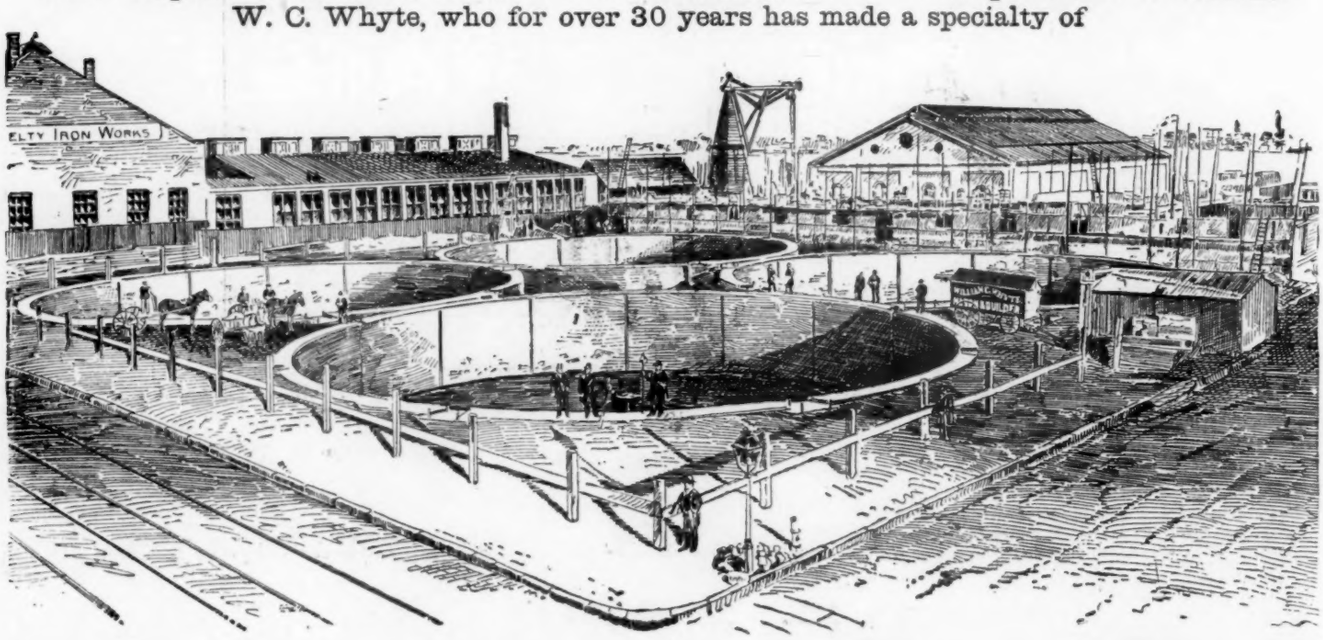

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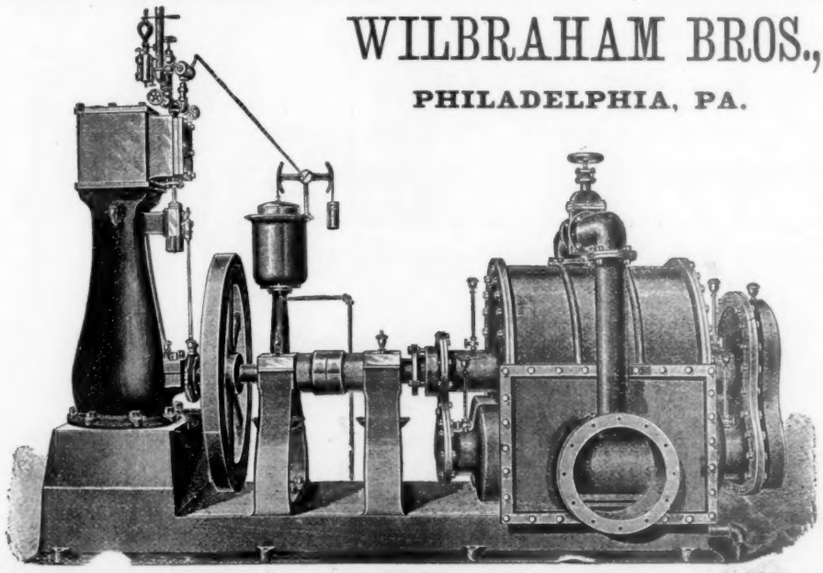

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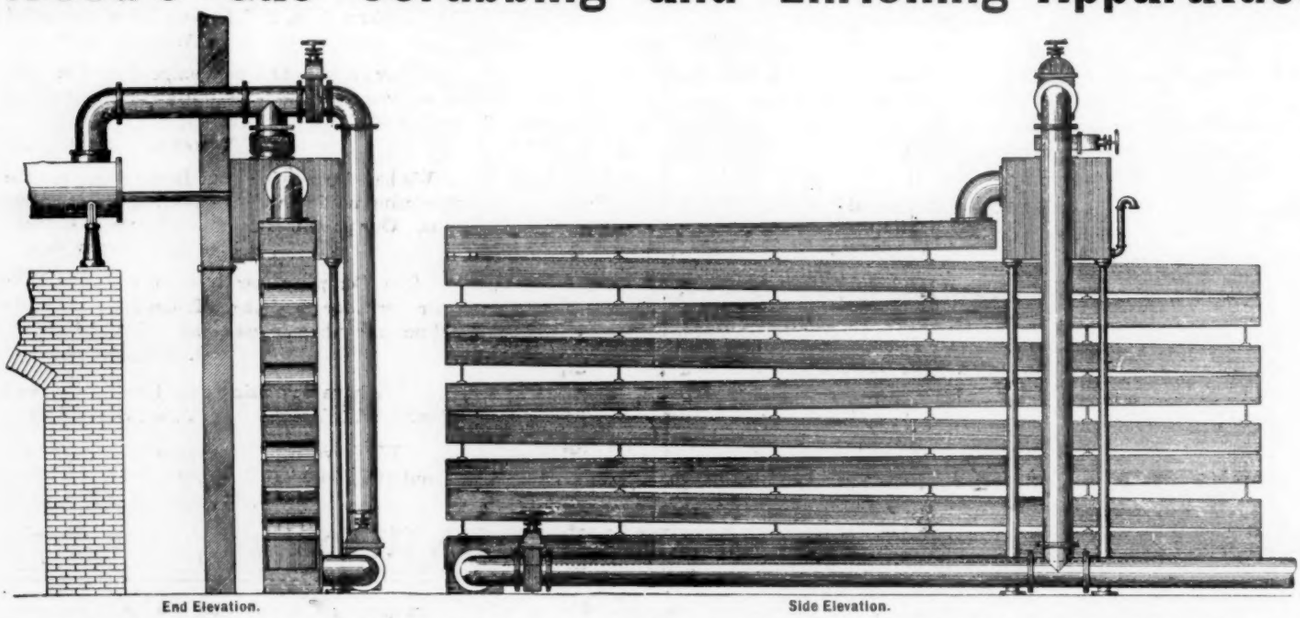

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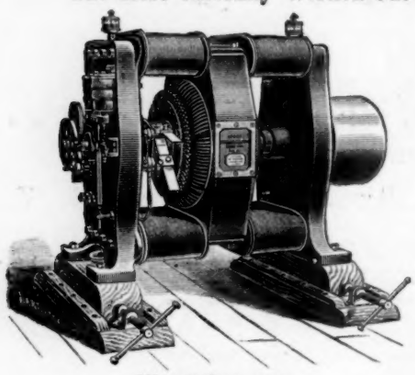

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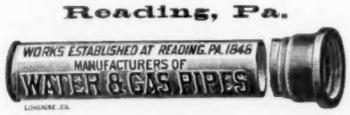

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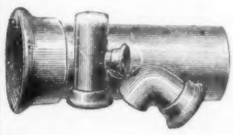

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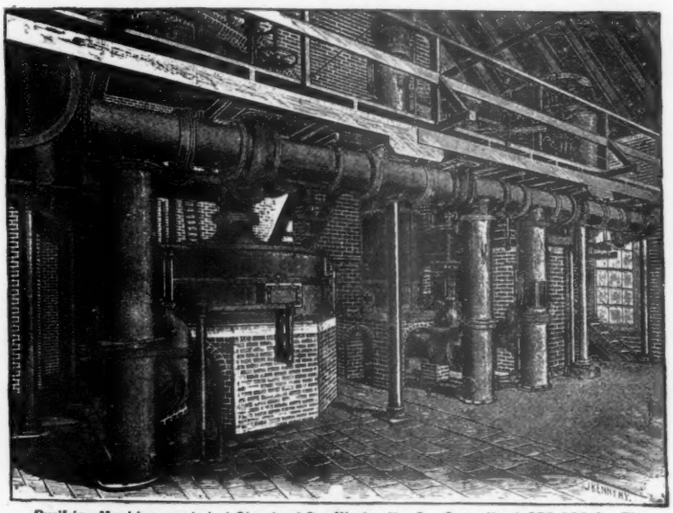

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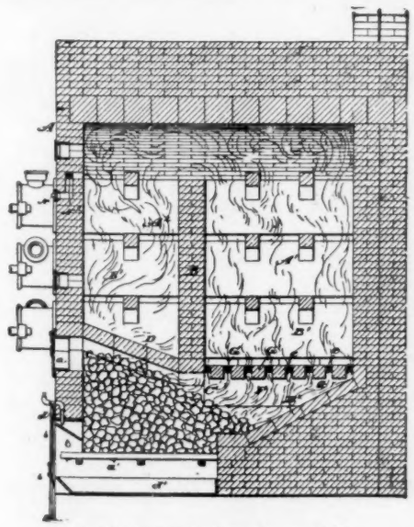

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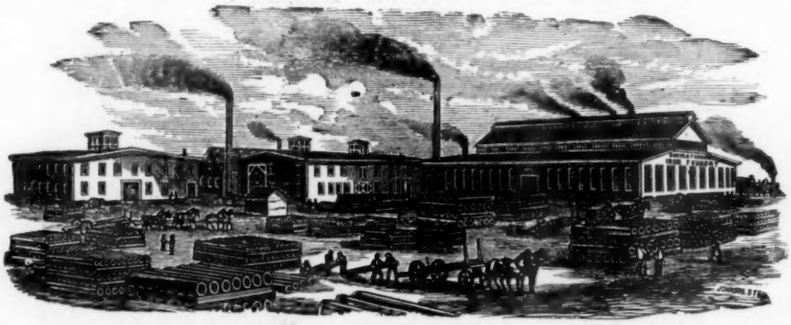

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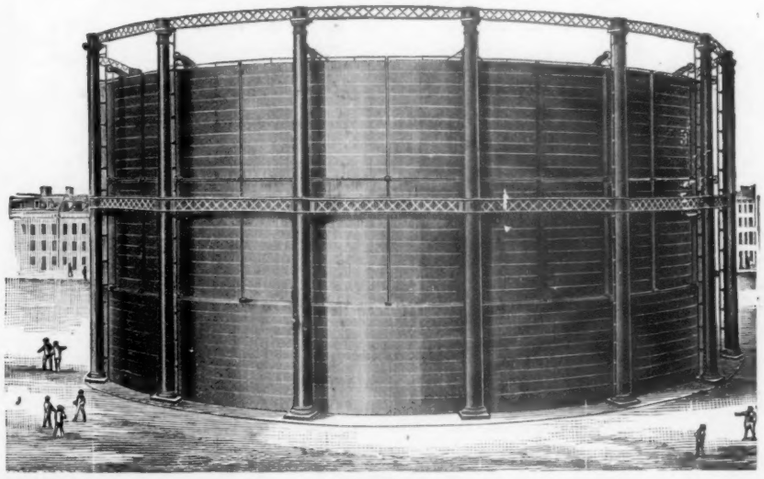

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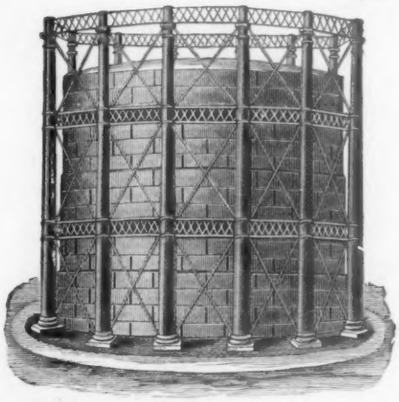

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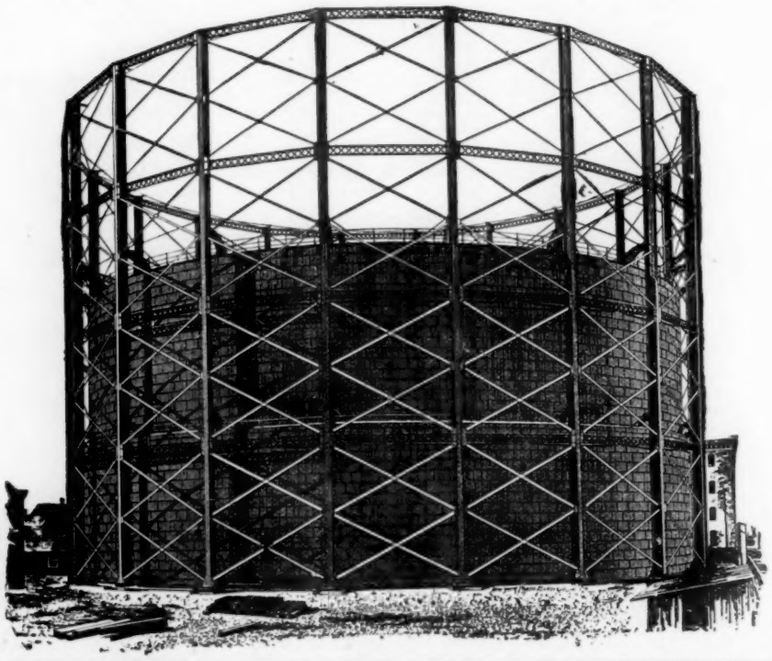

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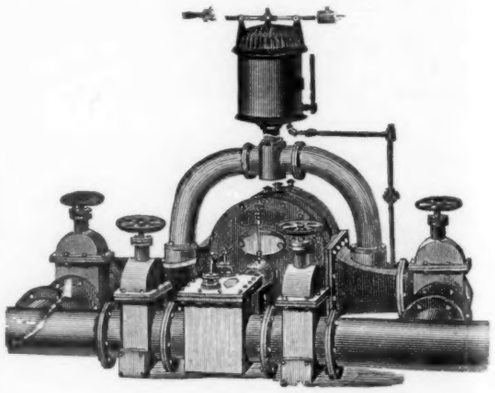

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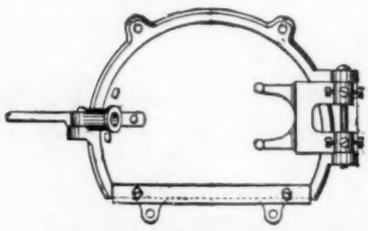

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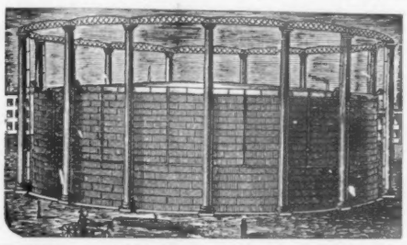
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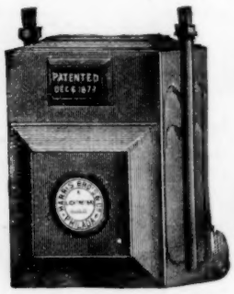

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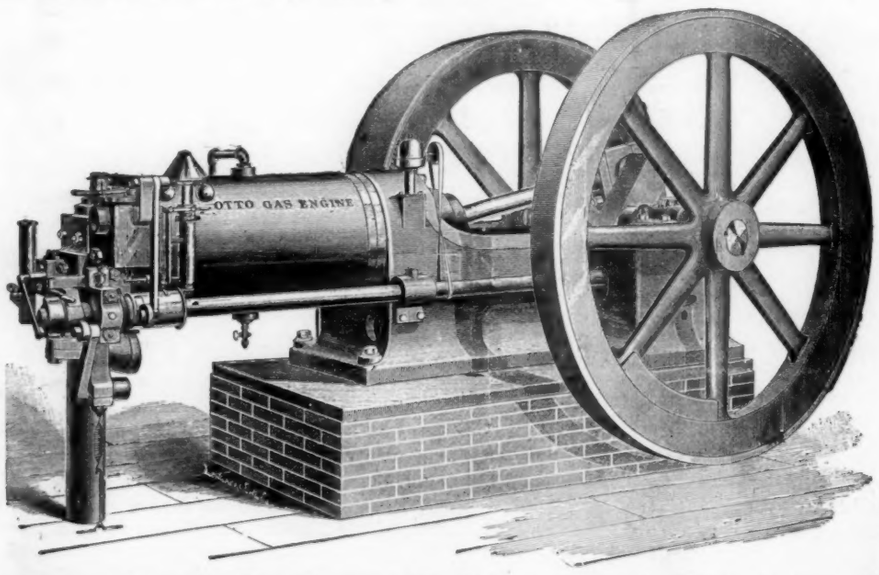

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